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DEAR READERS,

Issues of Rehabilitation, Orthopaedics, Neurophysiology and Sport Promotion – IRONS (formerly Issues of Rehabilitation Promotion) publishes the original papers, reviews, research reports and case reports from the fields of rehabilitation, physiotherapy, orthopaedics and neurophysiology as well as topics dealing with diagnostic and treatment of the sport related traumas. IRONS edits the scientific papers based on methods used in many medicine branches. IRONS is printed quarterly in Polish and English languages, both in printed journal and electronic versions. IRONS is dedicated to both advanced and experienced as well as young scientists.

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IRONS Editor in Chief
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SZANOWNI PAŃSTWO,

Z wielką przyjemnością i satysfakcją przedstawiamy Państwu suplement kwartalnika *Issues of Rehabilitation, Orthopaedics, Neurophysiology and Sport Promotion – IRONS*. W całości został on poświęcony tematyce omawianej w trakcie IX Poznańskiego Kursu Chirurgii Kończyny Górnej oraz I Zjazdu Polskiego Towarzystwa Barku i Łokcia. W suplemencie odnajdziecie Państwo wszystkie streszczenia z naszego spotkania, jak i nadesłane doniesienia.

Jako organizatorzy doceniamy wysiłek wszystkich autorów poświęcony na napisanie artykułów. Szczególne podziękowania należą się Redaktorowi Naczelnemu czasopisma, prof. dr hab. n.med. Juliuszowi Huberowi oraz Sekretarzowi Polskiego Towarzystwa Barku i Łokcia dr n.med. Joannie Wałęckiej, za ogromny wkład pracy w przygotowanie wszystkich materiałów w najlepszej formie i na czas.

Jesteśmy przekonani, że treść wolumenu będzie dla Państwa źródłem cennej wiedzy i umożliwi jeszcze pełniej wykorzystać uczestnictwo w tym naukowym wydarzeniu.



Dr hab. n.med. Przemysław Lubiatowski
Przewodniczący Polskiego Towarzystwa Barku i Łokcia
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Prof. dr hab. n.med. Leszek Romanowski
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Przewodniczący Komitetu Naukowego i Organizacyjnego

DEAR COLLEAGUES,

We are pleased and honoured to present the supplement volume of Issues of Rehabilitation, Orthopaedics, Neurophysiology and Sport Promotion – IRONS. It has been devoted and includes the topics presented during the 9th International Poznan Course in Upper Extremity Surgery and the 1st Meeting of the Polish Shoulder and Elbow Society. Abstracts presented at the Conference as well as Research Reports and Short Communications provided by speakers can be found in this volume.

Having hosted the events, we appreciate all effort of the authors devoted to writing the papers. We would like to give our special thanks to Prof. Juliusz Huber – IRONS Editor-in-Chief and Dr Joanna Wałęcka – Secretary of the Polish Shoulder and Elbow Society, for their enormous contribution in the preparation of all volumes resulting in outstanding outcome on schedule.

We are convinced that the journal edition will be a good source of knowledge which shall help to fully benefit the event.



Associate Professor Przemysław Lubiatowski
President of Polish Shoulder and Elbow Society
Co-Chairmen of Course and Meeting



Professor Leszek Romanowski
Head of Department of Traumatology,
Orthopaedics and Hand Surgery
University of Medical Sciences in Poznan
Co-Chairmen of Course and Meeting

NON-OPERATIVE TREATMENT IN SHOULDER PAIN. EVIDENCE BASED MEDICINE APPROACH

Ewa Bręborowicz, Maciej Bręborowicz

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The pain is one of the most common symptoms of shoulder injuries or disorders. Therapeutic team can choose the best option for their patients from many treatment methods. Not all of them are scientifically evaluated. The aim of this lecture is to determine which of the non-operative methods of the shoulder pain treatment are proved as effective in the literature. The most effective techniques of shoulder pain therapy are pharmacological treatment (corticosteroid injections, nonsteroidal anti-inflammatory drugs), physiotherapeutic exercises (stretching, shoulder muscle balance exercises, eccentric training), manual therapy (muscle relaxation techniques, myofascial trigger points therapy).

ARTHROSCOPIC TREATMENT OF PROXIMAL HUMERAL FRACTURES

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Surgical treatment of proximal humeral fractures requires precise reduction and optimal fixation of the fragments especially when articular surface is damaged. Arthroscopy has recently become more recognized in treatment of certain types of humeral fractures.

CLINICAL EVALUATION OF SHOULDER IN ATHLETE

Nikola Cicak

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Clinical evaluation of shoulder in athlete is challenging, particularly the examination of the overhead athletes. Repetitive stresses on the shoulder of overhead athletes may affect the injury of the soft tissue and bony structures. Direct injury with obvious damage in imaging studies is easy to recognize and may be adequately treated. Unfortunately, painful shoulder without obvious injury is difficult to find correct diagnosis even with imaging studies including the magnetic resonance. In that situation a history and clinical examination of patient are very important. A thorough history, type of sports and physical examination of the athlete will provide good insight into the pathology of the shoulder. The clinical examination of shoulder must include evaluation of medical history, posture, palpation, range of motion (in both arms), stability, scapulohumeral rhythm, strength and endurance of muscles, introducing the provocative maneuvers and special tests.

BRACHIAL PLEXUS INJURY: ASSESSMENT AND TREATMENT

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Brachial plexus injury can lead to severe upper extremity impairment. Appropriate clinical evaluation of newborn or adult has to be done to assess the current status and a possible regeneration phenomenon. In case of no improvement, the surgical treatment should be

undertaken approximately 3–6 months after injury. Surgery can involve in-situ repair of the plexus or nerve transfers outside. In case of late presentation or poor neurosurgical results, secondary procedures including the tendon transfers, joint fusions or osteotomies can be proposed to improve function of upper extremity.

EVALUATION OF PROXIMAL HUMERUS FRACTURES AND ITS NON-SURGICAL MANAGEMENT

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Fractures of the proximal humerus are common and present a challenge to the attending surgeon. A thorough evaluation should consist of precise history-taking and physical examination, accompanied by relevant imaging studies. Confronted with literature in support of differing treatment recommendations, a surgeon must then decide upon the optimal treatment plan for each individual patient.

INFECTIONS IN SHOULDER AND ELBOW SURGERY – INCIDENCE AND PREDISPOSITION

Robert Hudek, Birgit Werner, Frank Gohlke

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Surgical site infections can be devastating complications in shoulder and elbow surgery and should be prevented by all means. Several predisposing factors including preoperative preparation, technical equipment, surgical approach, dosing and timing of antibiotics and patient specific premorbidities should be acknowledged. We aim to expose the incidence and predisposition for infections in shoulder and elbow surgery and strategies for prevention.

INFECTIONS IN ELBOW ARTHROPLASTY

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Postsurgical infections gain special attention in elbow arthroplasty because many patients indicated for this procedure share a predisposition because of rheumatoid arthritis and consecutive immunosuppression. In cases of revision arthroplasty the combination of therapeutic strategies is necessary to eradicate the bacteria and to restore joint function. We aim to expose and discuss methods of detection of an infection including low-grade infections. Therapeutic approaches and surgical procedures are presented for the treatment of an infected elbow arthroplasty.

NEUROPATHIC PROBLEMS RELATED TO SCAPULA

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The scapula floats on the chest wall on a bed of muscles. Shoulder girdle muscles by means of trapezius, levator scapulae, rhomboid major et minor and serratus anterior support the scapula, participate during the hand movement and these muscles both stabilize the arm to the body and move the arm around in space. This motion is called scapulo-humeral rhythm. Any injury to supplying nerves leads to dysfunction of these

muscles and considerable pain, deformity and loss of upper extremity function. Most persistent clinical finding refers to “winging scapula”. Most important tests to define and confirm the diagnosis are electromyography (EMG) and nerve conduction studies (ENG). They are beneficial to diagnose and quantify the degree of nerve and muscle damage as well they are also useful to assess and follow the recovery of the nerves function. Most common neuropathic problems related to scapula are injury to long thoracic nerve with serratus anterior palsy. Injury to the spinal accessory nerve (trapezius palsy) leads to the lateral winging. Severe winging occurs in patients with fascio-scapulo-humeral muscular dystrophy. Mixed clinical picture of scapula problems are present during traumatic brachial plexus injury or the non-traumatic acute brachial neuritis (Parsonage-Turner syndrome). Each of these conditions should be recognized, because they require different methods of treatment, different period of conservative treatment, different type of surgery. The main aim of this lecture is to remind surgeons to look not only into shoulder joint, but around it, too. Nerve pathology around scapula is not uncommon and should be treated appropriately.

SUBSCAPULARIS TENDON TEARS: SOLUTIONS FOR REPARABLE AND IRREPARABLE TEARS

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SUMMARY

The authors claim, that all subscapularis tendon tears are possible to be repaired arthroscopically. The aim of this report is to show how the repair techniques differ each other depending on the type of rupture. Some tip and tricks are presented to show that an arthroscopic repair is not so difficult as it was supposed.

PROXIMAL HUMERAL FRACTURES – FIXATION

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Proximal humeral fracture is the third common type of fracture behind distal radius and proximal femur. In most cases it affects older patients (over the age of fifty) with the incidence increasing over the following three decades. Women are affected twice as much as men and this is related to osteoporosis. The aim of fixation is to restore the function as much as possible and to minimize a pain. The problem is that fixation management has not been standardized, yet. There are different kinds of fracture classifications, different surgical approaches and different kinds of fracture fixation. Before we make the final decision as to what kind of fixation we will use, we should try to understand the fracture, because “the first shot is the best shot”. This means that the treatment of proximal humeral fracture sequela is very difficult and the outcomes are poor.

IS ANATOMY CLINICALLY IMPORTANT IN SHOULDER SURGERY?**Bartłomiej Kordasiewicz****Shoulder Subunit, Trauma and Orthopedics Department, Otwock, Poland****Postgraduate Medical Education Centre, Warsaw, Poland****kl.chir.ur@spskgruca.pl**

Shoulder anatomy is relatively well known, having been described for a long time. Arthroscopy has brought some details, especially in the glenohumeral joint structures. Within last few years “out of the box” shoulder arthroscopy became more and more popular. This requires very good anatomic basics and some spatial orientation. The goal of this lecture is to present some aspects of open and arthroscopic shoulder anatomy and their correlation with the clinical practice.

SCAPULAR FRACTURES**Natascha Kraus****Department of Shoulder and Elbow Surgery Center for Musculoskeletal Surgery,****Charité-Universitaetsmedizin, Berlin, Germany****natascha.kraus@charite.de**

Scapular fractures account for 3–5% of all injuries to the shoulder girdle and 0.5–1% of all fractures. They are often indicative of a severe thoracic trauma in a polytraumatized patients. Typically, heavy blunt direct force to the shoulder girdle is necessary to fracture the scapula, the scapular spine and or the acromion due to the “recoil mechanism” on the thorax. Indirect levering or pulling forces may, in accordance to their severity, lead to glenoid rim or neck fracture as well as scapulothoracic dissociation, that may impair neurovascular structures and potentially results in a lethal outcome. Scapular fractures occur in high-velocity trauma such as traffic accidents, fall from great height or certain sports (horseback riding, skiing, snowboarding).

CURRENT ASPECTS IN ANATOMICAL ARTHROPLASTY**Natascha Kraus****Department of Shoulder and Elbow Surgery Center for Musculoskeletal Surgery, Berlin, Germany****natascha.kraus@charite.de**

Primary goals of anatomic shoulder arthroplasty are pain reduction, improvement of shoulder function, preservation of strength, low technique morbidity and a long implant survival rate. However, negative prognostic outcome factors are an external rotation of less than 0°, dorsal subluxation and fatty infiltration of the infraspinatus muscle. Therefore, the right moment of arthroplasty is crucial. Today, a variety of implants for anatomical arthroplasty is available on the market. Besides established and well-studied stem prostheses, surface replacement and stemless implants are used. Shoulder arthroplasty has made great progress from Neer’s initial first generation cemented humeral monoblock with a smooth surface and only mid-range sizes without the opportunity to reproduce the proximal humeral anatomy. Further investigation into anatomical variants led to the development of later generation components. Humeral components of the 4th generation provide a continuous modularity around three axes. Depending on the design they allow anatomic placement of the prosthetic humeral head in anteroposterior and mediolateral direction in reference to the stem as well as various degrees of head inclination. Today, problems of the humeral component are rare. Soft tissue insufficiency and glenoid component complications are more relevant in terms of revision and long-term survival rates.

RECURRENCE OF INSTABILITY AFTER THE LATARJET PROCEDURE

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The coracoid transfer (Latarjet procedure) is one of the most common procedures to treat the shoulder instability. It has been proven the high success rates in treatment, especially for cases of bone loss. However, the procedure bears a high risk of complications. The recurrence of instability following the coracoid transfer has been reported to make up 8.7%. The aim of the lecture is to review the issue of the recurrence of instability following coracoid transfer and present cases with a variety of solutions to the problem. No strong recommendations can be made based on the limited literature. Yet, in the case of the recurrence of instability following the Latarjet procedure several options are available. The decision should be made based on clinical picture (severity of instability, epilepsy) and imaging (bone deficits). The options include non-operative treatment (rehabilitation), soft tissue repair and reposition of reparable coracoid transfer or the bone-block glenoid reconstruction.

CONSERVATIVE TREATMENT OF THROWING SHOULDER

Milena Mirkovic

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EUSSER Education Committee Member

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Most overuse shoulder injuries in throwing sports are conservatively managed (Brukner 2012). Even in some cases where structural integrity of the shoulder complex is compromised through overuse mechanism conservative treatment has a role to play. The aim of this lecture is to present a case study of rehabilitating a 21 year old professional tennis player with supraspinatus tendinopathy.

CLINICAL EVALUATION OF SCAPULA FUNCTION AND PATHOLOGY

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Scientific evidence supporting the role of scapula dysfunction in patients with various shoulder problems is increasing. Although association between scapula dyskinesia and shoulder pain is high, it is not clear whether dyskinesia is the cause or effect of shoulder pain and associated pathology.

STIFF SHOULDER

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Stiffness of the shoulder is a clinical symptoms (mainly by means of limitation of the range of motion) that can occur either through muscle weakness (such as a rotator cuff tear) or through postoperative adhesions (rotator cuff repair), but the “true stiffness” is due to the condition called “frozen shoulder”. There is important difference between those conditions, what is often not appreciated by the clinicians. Proper diagnosis is crucial for the treatment choice.

TIPS AND TRICKS IN SHOULDER EXAMINATION

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Complexity of the shoulder anatomy and spectrum of disorders make the shoulder examination a real challenge for the surgeon. Clinicians should be aware that in some shoulder pathologies, the sensitivity of ultrasound and MRI diagnostics is low and the physical examination a crucial guiding tool in undertaking the decision about ways of treatment.

TIPS AND TRICKS IN SHOULDER ARTHROSCOPY (FROM PREPARATION TO PROCEDURE)

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Shoulder joint is a very complex structure of soft and hard tissues. Good visualization of the shoulder joint requires not only specialized equipment and experienced surgical team with significant skills and a in-depth knowledge of shoulder anatomy but also an experienced anesthetist's team. There are multiple approaches to the shoulder that should be chosen according to the individual procedure and surgeon's discretion. Good positioning of the patient and preoperative plan are essential. Despite high complexity of shoulder arthroscopy, there are few tips and tricks that may optimize the procedure and minimize complication rate.

COMPLICATIONS AFTER DISTAL HUMERUS FRACTURE

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Fractures of the distal humerus are a therapeutic challenge. Treatment options include conservative treatment, internal fixation or total elbow arthroplasty. The main complications after distal humerus fractures include malunions, nonunions, elbow contracture, heterotopic ossifications, neuropathies especially of the ulnar nerve and arthrosis of the elbow joint. Nonunions and malunions of the distal humerus are often due to incorrect initial treatment of a fracture. Elbow reconstruction include osteotomy for malunion or debridement for nonunion, realignment with stable fixation and autogenous bone grafts, anterior and posterior capsulectomy, ulnar neurolysis and removal of non-united fragments. The most difficult problem is to regain the extension of elbow. An arthrolysis is not always necessary during the first operation of a non- or malunion. It can be carried out, if necessary, by removal of implants. If treatment fails, the possibility of a joint replacement or an arthrodesis should not be forgotten.

PARALYZED ELBOW FUNCTION RESTORATION

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SUMMARY

Paralysed elbow results from lack of muscles function responsible for the movements of elbow joint. The aim of the paper was to review methods of paralysed elbow evaluation and

treatment basing on the own experience and data from literature on the topic. Preoperative diagnosis is based on history of the injury and on coexisting congenital disorders, patient's physical status, results of clinical examination. What is more, the additional diagnostic tests must be included (for example X-rays, CT scans, MRI scans or electromiography) performed before the treatment. The currently available operative techniques for paralysed elbow are the direct nerve reconstruction or secondary reconstructive surgery such as the nerve transfer and muscle tendon transfers. Open or arthroscopic arthrolysis in the elbow contraction operative treatment is considered.

MANAGEMENT OF COMPLICATIONS AFTER ROTATOR CUFF SURGERY

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Rotator cuff surgery changed dramatically since the systematic use of arthroscopic tools in the management of repair. Many factors such as the understanding of the anatomic details, the understanding of the natural history of the rotator cuff disease and the augmentation of the volume in the studies dedicated to this field of orthopaedics contributed to a better service for the patients and the improvement in the quality of life and in the patients comfort before, during and after surgery. A vast diversity of tools was developed to help and assist the surgeon in the management of an impaired shoulder and the volume of the surgeries performed all over the world increased exponentially. So did the complications with this surgery!

WHAT IS THE RESULT OF YOUR PUBLICATION AND WHAT WE EXPECT FROM A MEDICAL WRITER?

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SUMMARY

Medical publication has become a very important part of the medical profession. Scientific papers are necessary for the development of a medical specialist, the peer-reviewed journals are still the only accepted, reliable organizations that could promote and present the results of researches and their development. The author is Editor-in-Chief of the renowned journal "International Orthopaedics" and provides his point of view on this topic.

BICEPS TENOTOMY AND TENODESIS

Ruslan Sergienko, Mykola Satyshev, Iulian Bursuk

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Pain in the early postoperative period after rotator cuff (RC) arthroscopic repair with biceps tenodesis is a common problem. We present this lecture to determine how the opening of bicipital groove during intraarticular tenodesis influences the pain sensation after the surgery.

COMPLICATIONS AFTER PROXIMAL HUMERAL FRACTURES**Tomasz Sorysz****Department of Trauma and Orthopaedics Surgery, Gabriel Narutowicz Specialist Municipal Hospital, Cracow, Poland****tsorysz@gmail.com**

An analysis of the current state of the complications and difficulties in the treatment of proximal humerus fractures shows that there are still no effective repetitive methods for shoulder function restoration. There is ongoing discussion about how to fixate fractures. There is still a dispute about, if there is need to fixate the fracture at all cost or use of the prosthesis and which one. How to treat young people with multifragmentary fractures? Everyone dealing with the problem of fractures of the proximal humerus emphasizes that results depend on good diagnostic radiology with comprehensive analysis of CT scans and the experience of the surgeon. It is also noted that proceeding operations without suitable preparation of material and endoprosthesis should not be carried out.

RESTORATION OF SHOULDER MOTION AFTER BRACHIAL PLEXUS INJURIES**Sergiy Strafun****Department of Microsurgery and Reconstructive Surgery of the Upper Extremity, Institute of Traumatology and Orthopedics of the National Academy of Medical Sciences of Ukraine**
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Brachial plexus injury (ICD-10: S14.3) – peripheral nerve trauma at the level of neck and shoulder, which is characterized by a rough dysfunction of upper extremity, in most cases leads to disability. According to the literature, it constitutes 1.2% of all polytrauma, and in 2012 it increased by 30% compared to 2009. In 41% of cases, it refers to high level of damage at C5-C6 roots, that innervate the major muscle groups of the shoulder joint (deltoid muscle, rotator cuff, scapular group, and axillary-humeral group). According to A. Berger (1997), about 25–30%, and reports of Scottish National Brachial Plexus Injury Service (2009–2010) about 12% of patients (including 7% after neurotisation, and 5% as a primary treatment) require the orthopedic correction.

RECURRENCE OF INSTABILITY AFTER BANKART REPAIR**Karol Szyluk¹, Andrzej Jasiński¹, Michał Mielnik², Wojciech Widuchowski², Bogdan Koczy³****¹Department of Hand Surgery District Hospital of Orthopaedics and Trauma Surgery, Piekary Slaskie, Poland****²Department of the Knee Surgery, Arthroscopy and Sports Traumatology District Hospital of Orthopaedics and Trauma Surgery, Piekary Slaskie, Poland****³Department of Trauma and Orthopaedics, District Hospital of Orthopaedics and Trauma Surgery, Piekary Slaskie, Poland****kszyluk@o2.pl**

Nowadays it is generally agreed that patients with the diagnosed shoulder instability should be treated surgically. However, even now, surgery for shoulder instability is associated with a high recurrence rate. We present the analysis of the incidence of recurrent shoulder joint dislocation following state-of-the-art surgical treatment of Bankart lesions.

The Pubmed/Medline databases were queried to present and review the state-of-the-art on knowledge about the shoulder dislocation recurrence rate following open or arthroscopic surgical treatment of Bankart lesions. A statistical analysis of data from literature data failed to reveal significant differences in post-operative recurrence rates following open vs. arthroscopic Bankart lesion repair. Assessment of risk factors for recurrence, including

the presence of additional lesions and possibilities for treating them is useful during the planning of surgery and choosing the surgical technique.

BIOLOGICAL APPROACH TO THE ROTATOR CUFF REPAIR. FROM THE LAB TO THE PATIENT.

Joanna Wałęcka

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Shoulder pain is the second most frequent reason for patients' musculoskeletal complaints, the most common cause of pain being rotator cuff tendon tear. Although conservative treatment can be suggested in the initial period of disease, the surgical treatment is basic. The procedure commonly involves restoration of the continuity of the tendon to the bone. The development of arthroscopic surgery and implant technology allows for a minimally invasive stabilization of the tendon attachment to the bone. In the course of the development of the techniques for rotator cuff, tendon repair both biomechanical and biological aspects have been highlighted. However, despite the improvement in tendon fixation methods, the problem of healing tendon disorders still remains crucial and unresolved. The goal of lecture is outlining the use of growth factors, scaffolds and stem cells therapy during rotator cuff repair, which might be instrumental in improving tendon to bone healing.

OPERATIVE TECHNIC FOR SYNDACTYLY TREATMENT

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Introduction

The classic procedure of finger separation with the use of Z-plasty and full thickness skin autograft are sufficiently effective. However, in some cases, the finger flexion contracture occurs, that requires the revision surgery. Also we need additional section for skin autograft. In this report, we describe our experience with the alternative treatment method without a skin autograft in patients under 10 months old.

Aim

Syndactyly treatment among the toddlers is presented.

Material and methods

We have used the open technic for fingers separation in four patients. Patients age varied from 7 to 9 months. We used a sharp angled triangular flaps. A 7 to 9 skin flaps with underlying fat tissue were prepared on each finger. Only apexes of flaps were sutured. Fat tissue between flaps was left uncovered by skin. Web space was covered by dorsal rectangular flap. Skin autografts were not used. Ointment bandage was applied for 10 days. After operation we used immobilisation during 4 weeks.

Results

Follow-up varied from 6 months to 3 years. All patients were satisfied with the procedure. The estimation of effectiveness was conducted according to diagram. Assessment of scars, contractures, deformations, web space form was performed. Good results was obtained in all cases. The effectiveness of this operation was closely related to babies age. The high baby reparative facilities prevented from the hypertrophic scars formation, which could cause the finger deformity.

Conclusions

Our preliminary results showed the high efficiency of this procedure. This simple technic reduced the operation time. We used this technic for babies under 10 month old.

Keywords: syndactyly, treatment

PROXIMAL HUMERUS FRACTURE – A SAFE ALGORITHM FOR PROCEEDINGS

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Introduction

Fractures of the proximal humerus present today a significant problem in orthopedics especially for the young surgeons. Due to the wide variety of fracture morphologies there are still no evidence-based schemes or guidelines for the treatment. Many studies on the effectiveness of therapy with both operative and conservative methods do not give simple

tips and even force to re-analysis towards the indications to qualify patients to the proper choice of treatment. Starting with the proper diagnosis through an accurate assessment of anatomical conditions and the insightful planning how to proceed, there have been developed certain standards of treatment.

Aim and Methods

In this study draws attention the critical elements of the procedures planning. We have undertaken to confront our experience with indications of various authors in choosing the method of treatment. As a goal, we adopted to minimize the complications of the procedure.

Results and conclusions

It is important to determine the patient's expectations regarding the results of treatment. We took into account the impact of fracture morphology, bone quality and shoulder joint anatomical variants on the success of the treatment method. Based on a retrospective study of treatment at our hospital in patients with the complex proximal humeral fractures in 2013–2015 years, we presented our algorithm for their proceeding.

Keywords: proximal humerus fracture, algorithm of treatment

ARTHROSCOPIC TREATMENT OF GLENOID RIM FRACTURE IN ACUTE ANTERIOR SHOULDER INSTABILITY

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Introduction

Fractures of antero-inferior glenoid rim are usually associated with acute traumatic anterior shoulder dislocation. They require the operative treatment, which is recently more commonly performed arthroscopically. The proper portal positioning and preparation of tissues enables precise reduction and stable fixation of the fracture in a minimally invasive way.

Aim

The aim of this study was to assess the results of arthroscopic treatment of antero-inferior glenoid fracture associated with the anterior shoulder instability.

Material and methods

Six patients treated for glenoid fractures following the acute anterior dislocation were retrospectively evaluated. Follow-up period was from 10 to 25 months. Additional repair of other soft tissues was performed in 4 patients. Constant and Duplay-Walch scores, range of motion including external and internal rotation and recurrence of instability were taken into account.

Results

The final results (Constant score, Walch-Duplay score) significantly improved comparing to the baseline assessment. Persistent sensation of instability was observed in one patient. All patients reported excellent clinical results.

Conclusions

Arthroscopic treatment of antero-inferior glenoid rim fracture with cannulation is an effective, minimally invasive method and can be combined with repairs of concomitant injuries. Application of antero-inferior approach performed with arthroscopic assistance and precise implant placement reduced the risk of postoperative complications.

Keywords: glenoid fracture treatment, acute shoulder instability

THE RESULTS OF TREATMENT OF ANTERIOR SHOULDER INSTABILITY USING ARTHROSCOPIC EXTRACAPSULAR BLS PROCEDURE

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Introduction

Operative treatment of shoulder instability is associated with a relatively high recurrence rate. Currently, the bony procedures are the best treatment to prevent postoperative re-dislocations. The extracapsular stabilization of the glenohumeral joint with use of soft tissues procedures alone could be an option for some patients.

Aim

The aim of this study was to assess the results of treatment of the traumatic anterior shoulder instability by use of full extracapsular stabilization with BLS technique (Between Ligaments and Subscapularis tendon).

Material and methods

A hundred and twenty patients treated with BLS technique for anterior shoulder instability were retrospectively evaluated. Follow-up period was from 24 to 96 months. Rowe, Duplay-Walch, SST scores, range of motion including external and internal rotation and the recurrence of instability were taken into account.

Results

The final results of Rowe, Walch-Duplay and SST score significantly improved compared to the baseline assessment. No statistically significant restriction of active external and internal rotation was observed. Out of total amount of 120 patients, the recurrence of instability was observed in 13 (10.8%) patients, 17 (14.2%) patients complained of subjective sensation of instability or/and apprehension.

Conclusion

Statistically, the BLS technique has a similar re-dislocation ratio to the classic Bankart repair, however it is expected to prevent subsequent osteoarthritis by keeping the sutures away from the humeral head cartilage.

Keywords: anterior shoulder instability, Bankart lesion, BLS

ARTHROSCOPIC TREATMENT OF PROXIMAL HUMERAL FRACTURES

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Introduction

Surgical treatment of proximal humeral fractures requires precise reduction and optimal fixation of the fragments especially when articular surface is damaged. Arthroscopy has recently become more recognized in treatment of certain types of humeral fractures.

Materials and methods

Twenty-three patients were treated arthroscopically for proximal humeral fractures between 2008 and 2014. Pain and range of motion were assessed at the last follow-up after mean period of 11.1 months (range 1.5 to 31). All patients were operated arthroscopically. The surgical technique included joint lavage, reduction and fixation of the fragments with suture anchors, cannulated screws or a combination of both.

Results

At the last follow-up examination patients presented satisfactory range of motion. Fracture union was achieved in all cases. Mean VAS score was 1.04.

Conclusions

Arthroscopic is a powerful tool in treatment of proximal humeral fractures. It allows precise reduction and sufficient fixation of fracture fragments. Furthermore, concomitant lesions of soft tissues can be managed concurrently.

Keywords: proximal humeral fractures, arthroscopy

ARTHROSCOPIC MANAGEMENT OF FAILED POSTERIOR TRAUMATIC SHOULDER INSTABILITY TREATMENT

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Introduction

Restoring the proper tissue balance is the main goal in management of failed posterior shoulder instability (PSI). Wrong initial diagnosis, technical error, postoperative complication or combination of all this factors can be a cause of treatment failure.

Aim

The aim of this study was to evaluate the soft tissue and bony procedures applied in revision treatment of PSI.

Material and methods

Between 2007 and 2014, 12 patients were treated with posterior Bankart, posterior bone block combined with subscapularis muscle tenodesis in Perthes fracture. They were assessed at minimum 2 years follow-up (2–8 years).

Results

There was one case of re-dislocation associated with trauma. Mean limitation of 20° in internal rotation during 90° abduction comparing to unaffected extremity was observed. Walch-Duplay and Rowe scores increased significantly.

Conclusion

Proper indication, preoperative planning and application of the sufficient surgical treatment allow to prevent risk of failure in treatment of posterior shoulder instability. Our observations confirmed the high efficiency of arthroscopic treatment of PSI recurrence.

Keywords: posterior shoulder instability, revision, MacLaughlin procedure

ARTHROSCOPIC MANAGEMENT OF POSTTRAUMATIC COMPRESSION RELATED BRACHIAL PLEXUS PALSY

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Introduction

Arthroscopic brachial plexus release is a recently published method of treatment of post-traumatic neurological deficits around the shoulder.

Aim

The goal of this study is to present a case series of 3 patients with diagnosed and confirmed posttraumatic brachial plexus palsy in EMG examination. The patients were treated with arthroscopic decompression of brachial plexus.

Material and methods

The patients had undergone ineffective conservative treatment for at least one year prior to surgery. During the surgery, the plexus and peripheral nerves were released from scar tissues and posttraumatic adhesions. The procedure began with release of axillary nerve at its' intersection with inferior margin of subscapularis muscle. Afterwards, the musculo-cutaneous nerve was released. The neurolysis was continued after detachment of pectoralis minor insertion from coracoid, hereby visualizing brachial plexus in subclavicular space.

Results

Improvement of deltoid innervation and function was achieved. Increase of strength and range of motion including forward flexion, external rotation and abduction was observed. In two cases the improvement in EMG examination was recorded.

Conclusions

Arthroscopic brachial plexus release seems to be a promising method in treatment of posttraumatic shoulder girdle disorders with neurological deficits. Release of posttraumatic scar tissue and adhesions can restore the proper nerve transmission in a minimally invasive way.

Keywords: brachial plexus palsy treatment, arthroscopic brachial plexus release

EVALUATION OF SELECTED BIOMECHANICAL PARAMETERS AFTER SHOULDER STABILIZATION SURGERY

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Introduction

Capsule-ligamentous repair described by Bankart with further modifications is commonly used up today in patients with anterior shoulder instability. Many scientific reports present results of clinical and functional evaluation of the shoulder after shoulder stabilization. However, no isokinetic assessment after surgery was found in the literature.

Aim

The aim of this study was to clinically, functionally and biomechanically evaluate the shoulder after the capsulolabral stabilization.

Materials and methods

Forty-five patients after arthroscopic capsulolabral shoulder stabilization were evaluated. The control group consisted of 38 healthy volunteers. Clinical examination was performed before and after surgery. Isometric and isokinetic evaluations were performed postoperatively. The average follow – up was 4.4 years.

Results

Return to full activity was reported in 69% of patients. The apprehension test decreased significantly ($p = 0.000006$) at follow up. Ranges of flexion and abduction improved, ranges of shoulder rotations did not change. The results of shoulder functional scores improved. The results of peak torque, total work and muscle power (the isokinetic protocol) were

significantly lower in the operated shoulder in external rotation in comparison to the opposite healthy shoulders. The results of internal rotation were similar in both operated and opposite shoulders. The internal/external muscle group peak torque ratio was lower than normal value.

Conclusions

Most of patients could return to full activity. Sensation of shoulder instability significantly decreased postoperatively. Ranges of shoulder flexion and abduction increased after stabilization. The biomechanical parameters were significantly lower in external rotation in comparison to the healthy side. Muscle balance was lower than normal value and it could be a risk factor for further shoulder injury. To improve the muscle balance, physiotherapists should pay particular attention to external rotator muscles activity. Isokinetic and isometric evaluation corresponded to each other with results.

Keywords: shoulder instability, isokinetic evaluation, isometric evaluation, capsulolabral stabilization, biomechanics

ANATOMY AND FUNCTION OF SCAPULA AND SHOULDER GIRDLE

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Introduction and aim

Shoulder girdle is a complex structure composed of clavicle, scapula and proximal humerus. Sternoclavicular, acromioclavicular and glenohumeral joints and scapulothoracic articulation connect them with each other. Soft tissues – muscles, fasciae and ligaments, envelop them. Precise neurological coordination of shoulder girdle allows positioning elbow and hand in space.

Material and methods

PUBMED® base and anatomy text books search for materials concerning anatomy and function of scapula, scapulothoracic articulation and shoulder girdle.

Results

Scapula articulates with proximal humerus, clavicle and chest. Scapulothoracic articulation is not classic joint but it allows gliding movements of the scapula over chest. Those include protraction, retraction, depression, elevation, upward and downward rotation and tilts. It depends on coordinated muscle function. Scapula is almost completely engaged in those muscle attachments without any direct osseous or fibrous connection to the axial skeleton. Proper scapula motion contributes significantly to the shoulder girdle movements.

Conclusions

Scapula is important component of shoulder girdle. However doctors and physiotherapists often omit its role. One has to remember that if the function and motion of shoulder girdle would rely only on GH joint – it would never reach such extent that is observed in physiologic conditions. Lack of knowledge of shoulder girdle anatomy and function, including scapular element, impairs diagnosis and treatment process of shoulder disorders.

Keywords: anatomy of shoulder girde, anatomy of scapula, function

PROXIMAL HUMERAL FRACTURES – ARTHROPLASTY**Nikola Cicak****AKROMION, Special Hospital for Orthopedic Surgery, Krapinske Toplice, Croatia****nikola.cicak@akromion.hr****Aim**

The purpose of the study was to evaluate functional outcomes of hemiarthroplasty and reverse shoulder arthroplasty (RSA) in patients with fracture of the proximal humerus.

Materials and Methods

From 2008 to 2012 fifty-four patients were treated with shoulder arthroplasty for fracture of proximal humerus by the single surgeon. There were thirty-seven patients treated with reverse shoulder arthroplasty and seventeen patients with hemiarthroplasty. The average age for reverse prostheses was 73 years (range 50–87 years) and for hemiarthroplasties was 50 years (range 38–73 years). There were 31 female and 6 male patients in reverse group. There were 11 female and 5 male patients in hemiarthroplasty group. One patient had applied bilateral hemiarthroplasty. The average follow-up period was 45 months (range 24–72 months). Twenty-one patients had no previous surgery, sixteen patients had previous surgeries in reverse prosthesis group. In hemiarthroplasty group eleven patients (twelve shoulders) had previous surgeries, five patients were treated non-operatively. Three patients had conversion from hemiarthroplasty to reverse prosthesis (included in reverse group). Active range of motion and Constant score were evaluated at a final follow-up, minimum 2 years after surgery.

Results

Active elevation was 102°, external rotation 24°, internal rotation up to L4 in all patients with reverse prosthesis. In the group of patients without previous surgery treated with RSA, elevation was 116°, external rotation 24°, internal rotation up to L3. In the group of patients with previous surgery treated with RSA, elevation was 84°, external rotation 19°, internal rotation up to L4. Active elevation was 97°, external rotation 36°, internal rotation up to L2 in all patients with hemiarthroplasty. In the group of patients without previous surgery treated with hemiarthroplasty, elevation was 104°, external rotation 58°, internal rotation up to L1. In the group of patients with previous surgery treated with hemiarthroplasty, elevation was 83°, external rotation 36°, internal rotation up to L3. Constant score in all patients with reverse prosthesis was 54, in hemiarthroplasty 49. Constant score in patients without previous surgery treated with RSA was 68, in hemiarthroplasty group was 56, with previous surgery in reverse group was 42, and in hemiarthroplasty 40.

Conclusions

Patients with fractures of the proximal humerus treated with reverse shoulder arthroplasty had better functional results than patients treated with hemiarthroplasty (1.2). Patients without previous surgery treated with RSA and hemiarthroplasty for fractures had better functional results than patients who had undergone previous surgery.

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Keywords: proximal shoulder fractures, reverse shoulder arthroplasty, hemiarthroplasty

DIFFERENTIATED APPROACH TO THE TREATMENT OF UNSTABLE TENDON OF THE LONG HEAD OF THE BICEPS SHOULDER

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Introduction

Problem of instability of the long head of the biceps tendon is one of the topical question in modern traumatology.

Aim

The aim of this study was to evaluate the results of treatment of patients with instability of the long head of the biceps tendon with a differentiated treatment policy.

Material and methods

During period from 2004 to 2015 there were treated 66 patients with instability of the long head of the biceps. Lesions of the first type according to Bennet were detected in 10 (15.2%) of patients, 6 (9.1%) cases were classified by us to type II, 20 (30.3%) – a third type, 16 (24.2%) – fourth and 14 (21.2%) for the fifth type. In the treatment of patients with type I and II damage, we prescribed a course of the conservative therapy involving the temporary immobilization of extremities, followed by a course of the rehabilitation treatment. When treating the patients with type I, IV and V injuries, we immediately recommended the surgery using arthroscopy with techniques developed by the authors. The average period of postoperative follow-up was 3.1 ± 0.8 years.

Results

Using Oxford score we estimated the results of treatment as: excellent in 46 (74.1%) patients, good in 14 (22.6%), fair in 1 (1.6%), poor in 1 (1.6%).

Conclusion

When comparing the results of point scoring analysed in groups of patients according to the Bennet's classification before and after the treatment, we revealed the probability at $p > 0.05$ for a positive therapeutic effect.

Keywords: instability biceps tendon, differentiated treatment

SURGICAL TREATMENT OF THE OLD FULL-THICKNESS ROTATOR CUFF INJURIES

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Introduction

Problem of surgical treatment of old full-thickness rotator cuff injuries is one of the most important/the topical question/in the modern traumatology.

Aim

Carrying out this work, we prospectively evaluated the results of surgical treatment of old full thickness rotator cuff injuries (according to Makarevich, Beletsky classifications).

Material and methods

From 2003 to 2015, fifty six patients with the rotator cuff tear were operated using four different methods. There were 48 (85.7%) males and 8 (14.3%) females, aged 22–60 years old (mean 59.9 years old). Mean duration of follow-up was 23.6 months (range

6 to 60 months). All the patients underwent MRI and CT preoperatively for determination the extent of soft tissue and bone injuries. Forty-four (78.6%) patients were treated using the mobilization of injured tendons and muscles with following their reinsertion or suture, five (8.9%) patients underwent Makarevich plastic, three (5.4%) underwent Augereau-Apoil surgery, four (7.14%) underwent Debeyre procedure. In most cases, we were able to mobilize the tendons and accomplish their suture and reinsertion by transosseous sutures directly to the humeral head. However, in some cases, the severity of cicatricial process in the tendon determined the selection of one of the ways for plastic replacement of the defect. Preoperative and postoperative clinical assessments were performed with the Oxford score and Rowe rating scale for the shoulder.

Results

The results were excellent in 8 (14.3%) patients, good in 20 (35.7%), fair in 13 (23.2%) and poor in 15 (26.8%) cases.

Conclusion

Our investigation showed that usefulness of these surgical techniques which provided the positive clinical effects.

Keyword: rotator cuff surgical treatment

APPROACH TO ADDRESS THE INSTABILITY OF THE SHOULDER

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Introduction

Violation of the rotator cuff shoulder in the shoulder joint is one of the most common causes leading to the development of posttraumatic instability.

Aim

The aim of this study was to evaluate the results of treatment in patients with the post-traumatic instability of the shoulder joint using techniques aimed at restoring the anatomy and function of the rotator cuff.

Material and methods

During a period from 2004 to 2015, 652 patients with the shoulder joint instability were treated. The study was carried out by a continuous method of treatment. The average age of the patients was 46.8 ± 5.9 years. 523 patients were operated using a mini-open interventions, 129 using the arthroscopic reconstruction of the rotator cuff of the shoulder developed by the authors procedures. The average period of postoperative follow-up was 4.8 ± 2.3 years.

Results

The results were excellent in Rowe score in 599 (91.8%) patients, good in 42 (6.4%) patients, fair in 2 (0.3%) patients and poor in 9 (1.4%) cases. Our investigation showed that usage of these surgical techniques provided the positive clinical effects.

Conclusion

Surgical interventions on the shoulder rotator cuff allowed for restoration of anatomic relationships, they were efficient and with a good functional results to restore the stability of shoulder joint.

Keyword: shoulder instability

MECHANISMS OF GLENOHUMERAL STABILITY AND DISLOCATION BASED ON EXPERIMENTAL MODEL

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Introduction

Intra-articular pressure (IAP) plays an important role in shoulder stability. However, the mechanism and phenomena occurring during dislocation have not been clearly explained so far.

Aim

The aim of the study was to explore the correlation of IAP and the distraction force of the glenohumeral joint in the function of time and displacement. The second aim was to demonstrate the mechanism of dislocation, based on physical background in experimental model.

Material and methods

The study was based on the swine shoulder. Glenohumeral distraction was performed with velocity of 0.2 mm/s by means of MTS machine. Distraction force, displacement and IAP were recorded simultaneously, during recordings of visual changes in capsular shape.

Results

This study showed a non-linear correlation between IAP and a distraction force. The shape of the curve was typical for isometric and thermodynamic transformations according to the Boyle's law. With the increasing force that exceeded a soft tissue resistance, the capsule was sucked into the joint. This led to decreasing of contact area of the joint surface area responsible for a counterforce against the dislocation of humeral head. Basing on the mathematical calculation and laws of physics, the area of glenoid delivers the force related to a pressure of around 120 N and it has been confirmed in our experiment.

Conclusions

The study confirmed the shoulder stability mechanism which can be explained by the Boyle's law. The results showed also a mechanism of dislocation which is dependent on a tissue elasticity and the pressure related to an intraarticular interposition of the capsule. The demonstrated phenomena may explain the increased risk of dislocation in cases of lesions or defects in glenoid, labrum, humeral head (Hill-Sachs) or capsular laxity.

Keywords: glenohumeral stability and dislocation, experimental model

CAN WE PREVENT SHOULDER INJURIES IN ATHLETES?

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Introduction and aim

It is well documented that the repetitive overhead movement patterns lead to shoulder injuries. That is why we have decided to evaluate and update the evidence of the effectiveness of prevention programs to decrease injury rates in non-injured overhead athletes.

Material and methods

The design of this systematic review was developed using the PRISMA guidelines. The following electronic databases were systematically searched: MEDLINE, PubMed, PEDro, CINAHL, SPORTDiscus™, the Cochrane Central Register of Controlled Trials (CENTRAL). We decided to perform 2-way of outcomes analysis. First was based on absolute parameters of efficacy injury prevention programs, such as decrease of shoulder injury rate during analyzed period of time. Second way of analysis was conducted with relative outcomes; e.g. improvement in biomechanical factors as a result of applied injury prevention programs, such as shoulder isokinetic strength, range of motion or throwing velocity.

Results

Twenty-two randomized controlled trails or clinical controlled trails of appropriate studies were analyzed. No article gave details of an absolute number of athletes' shoulder injury rate that had changed as a result of prevention program. The secondary outcomes used to assess the effectiveness of implemented prevention and/or functional program can be stratified into several aspects: strength, explosive strength/power, work, velocity/speed, range of motion and flexibility. Analysed prevention and/or functional improvement program usually consisted of few parts and was based on isotonic strength training, isokinetic concentric and/or eccentric strength training, elastic resistance, power training, core strength training, stretching/flexibility, plyometric training, and sport specific conditioning games.

Conclusions

There is a limited number of reliable publications where relative outcomes are used to assess the effectiveness of prevention and/or functional improvement programs in non-injured overhead athletes. Due to a lack of papers regarding absolute injury outcomes, further RCT are needed to investigate the efficacy of programs aimed at reducing injury risk.

Keywords: shoulder, injury prevention, overhead athletes

IMPACT OF EXTREMITY DOMINANCE ON FOREARM MUSCLES BIOMECHANICAL PARAMETERS IN TENNIS ELBOW CASES

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Introduction

Tennis elbow is the one of the most common upper limb pathology. Biomechanical testing is more and more appreciated due towards the patients' muscle objective testing.

Verification of muscles function is remarkably important according to the treatment choice and further prognosis.

Aim

The aim of the study was to assess the forearm muscles biomechanical parameters of tennis elbow patients towards the extremity dominance.

Materials and methods

Seventy three patients with unilateral tennis elbow (32 women, 41 men) and 70 healthy volunteers (33 women, 37 men) were examined with isotonic protocol on Biodex System 4 Pro® dynamometer. The protocol consists of 3 trials with constant tension 0.5/1/0.5 Nm combined with the repetitive wrist flexion and extension movements. Global grip strength was conducted with 3 maximal global grip testing with Biometric electronic dynamometer. To assess the patients status, VAS and QuickDash Questionnaire were used.

Results

Wrist and fingers extensors biomechanical parameters (average power, total work) were significantly lower than wrist and fingers flexors biomechanical parameters ($p < 0.01$). Results of the dominant tennis elbow extremity were significantly lower than the results of the control group but greater than healthy non-dominant results. Results of the non-dominant tennis elbow extremity were significantly lower than the control group and a dominant healthy limb. There were no significant differences between average grip strength comparatively to the healthy extremity and a control group.

Conclusions

Tennis elbow leads to the significant decrease of wrist and fingers extensors biomechanical parameters in comparison with wrist and fingers flexors. Extremity dominance significantly affects the decrease of the forearm muscles biomechanical parameters inhibition. Extremity dominance do not influence the global grip strength.

Keywords: tennis elbow, forearm muscles, biomechanical examination

BIOMECHANICAL PROFILE OF SPORT SHOULDER

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Aim

To compare shoulder rotation ranges and deficits between professional handball players and the control group of healthy non athletes and to examine any differences in the level of shoulder joint position sense (JPS), muscle balance, strength, endurance and power.

Material and methods

Eighty-seven professional male handball players and 41 healthy male volunteers. Study protocol included: measurement of range of internal and external rotation and proprioception using the electronic goniometer, expressed as error of active reproduction of the joint position (EARJP).

Results

There were no significant differences between rotation deficits, external rotation gain and occurrence of rotation deficits comparing athlete group to the control group. Athletes with shoulder pain had significantly decreased external rotation and total arch of motion.

Internal impingement coexisted with decreased rotations. The handball players present superior shoulder joint matching ability in the throwing shoulder at highest ranges of motion when compared to the contralateral one and the dominant shoulder of the non-athlete population and significantly greater isokinetic parameters comparing to control group.

Conclusions

The results are important for the application and interpretation of isokinetic data of handball players and can be use in both rehabilitation and prevention of shoulder injuries.

Keywords: overhead athlete, handball, throwing sport, range of motion, glenohumeral internal rotation deficit, total arch of motion, shoulder proprioception, joint position sense, isokinetic evaluation

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CLINICAL AND BIOMECHANICAL RECOVERY FOLLOWING THE SHOULDER INSTABILITY AND LABRAL REPAIR

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Introduction

Clinical and biomechanical testing may help in the objective evaluation and decision making for the patients treatment to return to sport or heavy labour following the shoulder surgery. The recovery may run differently in different instability cases (anterior vs. posterior) and procedures (Labral repair vs. Latarjet procedure).

Aim

The aim of the study was to evaluate the recovery of range of motion (ROM) and the isokinetic parameters following a surgical treatment for shoulder instability.

Material and methods

Study was based on 50 patients operated in 2014–2015 for the shoulder instability and having both clinical and isokinetic testing. Anterior instability was addressed by Labral repair in 31 and by Latarjet procedure in 8 patients. Posterior instability was addressed by Labral repair in 11 patients. ROM was evaluated preoperatively, at 8, 14 and 24 weeks postoperatively and isokinetic testing at 14 and 24 weeks postoperatively.

Result

Full range of flexion and abduction was achieved at 14 weeks following operation. External rotation (ER) was regained at 24 weeks, however it was significantly lower in Latarjet group. Isokinetic parameters improved over time, however some deficits in ER measures remained (8–12% in lowest, 33–55% in highest velocities). Strength testing revealed significantly lower values in Latarjet procedure in both IR and ER comparing to anterior and posterior Labral repair. Posterior instability recovered the best in the groups.

Conclusions

Full strength and ROM recovery are possible within 6 months following the posterior Labral repair. Anterior Labral repair may take longer to achieve a full recovery. Latarjet procedure provided lowest parameter in ER and strength testing.

Keywords: shoulder instability, Labral repair, Latarjet procedure, clinical and biomechanical testing

A LOCKED, CHRONIC, ANTERIOR SHOULDER DISLOCATION TREATED WITH AN OPEN REDUCTION AND A GLENOID RECONSTRUCTION USING AN AUTOGENOUS TRICORTICAL ILIAC CREST BONE GRAFT

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Introduction

This case report presents the challenges of the surgical management for a patient with a history of locked, chronic anterior shoulder dislocation.

Aim

The purpose of this case report is to present the surgical technique and to outline the decision making process.

Material and methods

A 33-years old man dislocated his left shoulder in May 2015, when he fell heavily. He visited our clinic in December 2015. Radiographs and computer tomography demonstrated an anterior dislocation with a huge lesion of anterior glenoid. In order to address both problems, we decided for open reduction and reconstruction of the anterior glenoid bone loss using an autogenous tricortical iliac crest bone graft. We explored the shoulder via a deltopectoral approach with osteotomy of the coracoid process. The biggest problem was to remove all scar tissues and a circumferential capsular release of the shoulder, especially posterior capsulotomy.

Results

One month after surgery the shoulder was stable, but the patient was during the process of rehabilitation and we had to wait for long-term results.

Conclusion

The locked, chronic anterior shoulder dislocations are very rare and remain a huge challenge from the treating surgeon. The deep analysis of the complete patient's history and his or her expectations, careful clinical and radiologic examination are crucial in the decision making process.

Keywords: locked-chronic anterior shoulder dislocation, bone-block, glenoid bone loss

IS ANATOMY CLINICALLY IMPORTANT IN SHOULDER SURGERY?

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Introduction

Shoulder anatomy is relatively well known, having been described for a long time. Arthroscopy has brought some details, especially with reference to glenohumeral joint structures. Within last few years "out of the box" shoulder arthroscopy became more popular. This requires very good anatomic basics and some spatial orientation.

Aim

The goal of this study was to present some aspects of open and arthroscopic shoulder anatomy and their correlation with the clinical practice.

Material and methods

This study was based on the information found on anatomical studies published in 2000–2015 in PubMed database. Additionally 21 fresh cadavers were dissected in Forensic Medicine Department at Warsaw Medical University. This step-by-step dissection allowed to visualize all structures from “out of box” to the glenohumeral joint itself.

Results

Three anatomic areas were presented with special attention to their clinical influence: coracoid process, coracohumeral ligament and glenohumeral joint capsule.

Conclusion

Results of this study confirmed several important anatomic factors, which should be taken under consideration in clinical practice. It is crucial to know all anatomic relations of the coracoid process. Coracohumeral ligament is one of these structures, spanning into the capsular wall. Subsequently the capsular tissue reinforced with the ligaments stay very tightly related to the rotator cuff tendons. These facts are very important when open or arthroscopic surgery is applied.

Keywords: shoulder anatomy, surgery

HIGHER RELIABILITY OF 3-DIMENSIONAL VS 2-DIMENSIONAL COMPUTED TOMOGRAPHY MEASUREMENT IN EVALUATION OF GLENOID BONE LOSS

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Introduction

Accurate assessment of glenoid bone loss is important in preoperative decision making and planning. Research which quantified glenoid osseous defects in patients with anterior instability has usually used two-dimensional (2D) measurement on 2D and three-dimensional (3D) reconstructed computed tomography (CT) images. However, these methods for evaluation of glenoid bone loss can poses certain limitations.

Aim

We have studied intra- and inter-observer reliability of glenoid parameters with the use of 2D and 3D reconstructed CT images in order to establish which method is more reliable for glenoid bone loss diagnosis.

Material and methods

One hundred glenoids were measured with the use of 2D-CT and 3D-CT by two independent observers (one experienced and one inexperienced). Measurements were repeated after one week for 30 randomly selected glenoids.

Results

Intraclass correlation coefficient (ICC) for inter-observer reliability was significantly better for 3D-CT (ICC 0.811 to 0.915) than for 2D-CT (ICC 0.532 to 0.925). All intra-observer reliability values for 3D-CT were near perfect (0.835 to 0.997), while those for 2D-CT were less reliable (0.704 to 0.960).

Conclusions

Therefore, it can be concluded that 3D glenoid reconstructions are more reliable for glenoid bone loss assessment than 2D-CT. The results suggest that quantifying a glenoid defect with the use of 2D image only is prone to errors. Differences in measurements between and within observers can be explained by plane setting and identifying glenoid rim in 2D-CT. Thus, we recommend that glenoid measurements should be performed on 3D reconstruction obtained from CT images.

Keywords: glenoid defect, computed tomography, three-dimensional reconstruction, scapula

DIRECTIONAL ASYMMETRY: DOES IT INFLUENCE THE SIZE AND SHAPE OF THE GLENOID CAVITY?

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Introduction

Directional asymmetry refers to non-pathological differences between sides of the body which result from lateralized behaviours and biomechanical pressures. Furthermore, size and shape differences between sides of the body are more pronounced in upper than in lower human limbs.

Aim

Taking into account the above information, our present research had one main objective. We used three-dimensional geometric morphometrics to analyze shape differences in the glenoid cavity and linear morphometrics to obtain the degree of directional asymmetry in a medieval population.

Material and methods

To calculate a directional asymmetry, left and right glenoid cavity from 100 individuals (50 females, 50 males) was measured. Additionally, landmarks and semilandmarks were placed within a three-dimensional reconstruction of the glenoid cavity for analysis of shape differences between sides of the body within sexes.

Results

Linear morphometrics show significant directional asymmetry in both sexes in the glenoid cavity. In turn, geometric morphometrics reveal significant shape differences of the glenoid cavity between sides of the body in females but not in males.

Conclusion

These findings contribute new evidence to studies on directional asymmetry and show that the glenoid cavity is characterized by a heightened degree of directional asymmetry. Non-pathological shape differences of the glenoid cavity between side of the body should

be taken into account in preoperative decision making and planning. Therefore, similar studies including the glenoid fossa on modern populations with different activity levels should be conducted in the future.

Keywords: scapula, computed tomography, three-dimensional reconstruction, geometric morphometrics

THE CONCEPT AND VALUE OF BICEPS RELOCATION IN DIAGNOSIS OF SHOULDER INSTABILITY

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Introduction

The biceps tension may have important role in mechanism of shoulder stability not only by compressing forces but mainly by controlling the intraarticular pressure. Originally the active biceps relocation test (BRT) was described as biceps load test for the diagnosing of SLAP tears in the recurrent shoulder instability. We explain different application and mechanism of tensioning the biceps to act as a relocation in patients with the anterior shoulder instability and labral lesions.

Aim

The purpose of the study was to evaluate the reliability of active and passive biceps relocation test (BRT) in detection of shoulder instability.

Material and methods

Study was based on 37 patients with the anterior recurrent shoulder instability and confirmed the labral lesion and 35 age-matched patients as a control (no instability, no labral lesions). Clinical test was evaluated by 2 independent examiners. Diagnosis was confirmed with arthroMR and/or shoulder arthroscopy. Cohen's Kappa coefficient was used to evaluate the intra-rater and inter-rater reliability and the agreement with relocation test. Sensitivity, specificity and predictive values were calculated.

Results

Passive BRT revealed the perfect agreement when compared between the raters, examinations and a relocation test. Active BRT was slightly less valuable and showed a moderate to a very good agreement. Both test were perfectly specific and sensitive, they ranged from 0.89 to 0.97. Positive predictive value ranged from 0.88 to 0.97 and negative was 1.

Conclusion

Both active and passive biceps relocation tests proved to be highly valuable in the clinical diagnosis of anterior shoulder instability, with a high level reliability, sensitivity and specificity. We suppose that its main mechanism is by increasing the intraarticular vacuum effect.

Keywords: biceps relocation test, shoulder instability, diagnosis

CLINICAL EVALUATION OF SCAPULA FUNCTION AND PATHOLOGY

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Introduction

Scientific evidence supporting the role of scapula (dys)function in patients with various shoulder problems is increasing. Although association between scapula dyskinesia and shoulder pain is high (Struyf *et al.* 2012), it is not clear whether dyskinesia is the cause or effect of shoulder pain and associated pathology.

Aim

To summarise a comprehensive clinical assessment of scapula including manual correction tests in the context of shoulder pain to help guide clinicians in deciding whether rehabilitating scapula dyskinesia may be of high or low importance for their selective patients.

Methods and results

Objective assessment should start with observation of the shoulder complex. Two commonly accepted definitions of altered resting scapula position are tilting and winging (Struyf *et al.* 2012). To assess scapula motion and possible dyskinesia, active range of motion (AROM) tests should be performed. If scapula dyskinesia is identified together with symptom reproduction then the scapular assistance test is performed to evaluate whether facilitating scapular upward rotation and posterior tilt would decrease presenting symptoms and improve quality of movement. Manual muscle tests and special tests should then be performed. In the event of weakness and/or pain reproduction during any of the tests the scapular reposition test is performed to evaluate whether facilitating scapula retraction (or another indicated movement) would decrease symptoms or improve strength. If the symptom modification manoeuvres significantly reduce symptoms and improve function then it adds confidence that treating scapula dyskinesia may be of high priority.

Conclusions

Finally to remind the clinician to complete the rest of the assessment of the shoulder complex to ensure it is structurally intact. Treatment of scapula dyskinesia may only be successful if the anatomical base is optimal (Kibler *et al.* 2010).

Keywords: scapula function, clinical evaluation

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CONSERVATIVE TREATMENT OF THROWING SHOULDER

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Introduction

Most overuse shoulder injuries in throwing sports are conservatively managed (Brukner 2012). Even in some cases where structural integrity of the shoulder complex is compromised through overuse mechanism conservative treatment has a role to play.

Aim

To present a case study of rehabilitating a 21 year old professional tennis player with supraspinatus tendinopathy.

Method

A 21 year old professional tennis player developed a gradual onset of intermittent right shoulder pain following a match which involved heavy tennis balls and inconsistent second serve performance. MRI results showed 1 cm by 5 mm partial-thickness supraspinatus tear next to glenoid attachment, background supraspinatus tendinopathy and mild subacromial bursitis. Dynamic ultrasound identified an intra-substance tear which resembled tendinopathy. Conservative treatment was indicated by the specialist five days following a corticosteroid injection into the subacromial space to help decrease pain. Rehabilitation goals were to decrease pain with relative rest and unloading from painful activities, restore normal scapulo-humeral rhythm, increase rotator cuff strength and restore global shoulder strength back to pre-injury level, restore normal mechanics and frequency of serving.

Result and conclusion

After 12 weeks of rehabilitation and gradual re-introduction to serving, the player resumed competition with no subsequent recurrence of injury.

Keywords: rehabilitation, shoulder, throwing

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PROXIMAL HUMERUS FRACTURE – TO OPERATE OR NOT TO OPERATE

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Introduction

Fractures of the proximal humerus account for 45% of the humerus fractures and 5% of all fractures. Consequences of fracturing in the proximal humerus are the decreased mobility and pain in the shoulder joint that can significantly impair the daily functioning.

Aim and methods

The controversy regarding the selection of procedures for the treatment of fractures, especially multifragmentary, led to the development of many methods of fixation, both based on the principles of ORIF and the minimally invasive procedures. During the last few years we can observe the increasing role of primary arthroplasty of shoulder joint. The research group are patients with proximal humerus fractures treated in years 2013–2015.

Results

While choosing a method of treatment it should be taken into account the fact that the studies often do not show superiority of complex surgical procedures over the non-invasive treatment. Various-age-population was taken into account. We compared the functional effects, based on the survey and a physical examination, regarding the operational and non-invasive treatment of fractures 2, 3 and 4 fragment according to Neera classification.

Conclusion

We hope to draw attention to the significant influence of the moment of surgery, as well as the differences in expectations as to the results of treatment depending on patient's age. The study also highlights the important role of early physical therapy.

Keywords: proximal humerus fracture, surgical treatment, non-operative treatment

A COMPARISON OF SHOULDER FUNCTION AFTER SURGICAL TREATMENT SHOULDER INSTABILITY USING ARTHROSCOPIC BANKART AND OPEN LATARJET METHODS

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Introduction

Arthroscopic Bankart procedure and open Latarjet procedure are common methods in the treatment of shoulder instability. The choice between these procedures unfortunately often depends on the surgeons experience and preference.

Aim

Comparison of shoulder function after surgical treatment shoulder instability using arthroscopic Bankart and open Latarjet methods.

Material and methods

In retrospective research, there were compared treatment results in 30 patients operated using the arthroscopic Bankart procedure and 30 patients operated with the open Latarjet procedure. Operations were performed in the same center by one surgeon. Only patients without the shoulder dislocation recurrence were compared. Both groups were comparable except those included in the ISIS (Instability Severity Index Score), which were higher in the Latarjet procedure. Minimum follow-up was 20 months (mean 39 months). The patients opinion about shoulder stability, shoulder range of movement and on possibility of returning to sport were taken into account. Shoulder stability and shoulder ROM were also estimated by clinical examination. Self-assessment scores WOSI and The QuickDASH were used.

Results

In the patients opinion about shoulder stability there was no difference between these two groups. However, the pain was present more frequently in the Bankart group (66.7% vs 33.3%, $p = 0.0098$). Despite no difference in subjective deficits of shoulder movement, clinical estimation showed differences in the arm rotation. The Latarjet group had a reduced arm rotation. Internal rotation of an operated dominant extremity was (80.000 vs 63.000, $p = 0.0102$). External rotation of an operated non-dominant extremity was (69.290 vs 50.670, $p = 0.0088$). There were generally no differences between these two groups in the WOSI and The QuickDASH scores. Despite of this, younger patients who were operated achieved worse results ($P = 0.0288$). The best results were achieved by less sport active patients in the Latarjet group (81.3 vs 91.2, $p = 0.0188$).

Conclusions

Despite no difference in general results between Bankart and Latarjet procedures, younger patients after the Bankart operation achieved worse results. Also sport active patients after the Latarjet procedures achieved worse results, probably due to rotation deficits accompanied with this method.

Keywords: Bankart procedure, Latarjet procedure, shoulder instability, arthroscopy

A COMPARISON OF THE CLINICAL OUTCOMES OF PROXIMAL ARTHROSCOPIC AND OPEN SUBPECTORAL BICEPS TENODESIS

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Introduction

Tenodesis of the long head of the biceps tendon has become a popular surgical treatment option for the patients with shoulder pain due to a diseased or unstable biceps tendon. It is not clear whether the proximal arthroscopic or open subpectoral biceps tenodesis have a clinical advantage.

Aim

Comparison of the clinical outcomes of proximal arthroscopic and open subpectoral biceps tenodesis.

Material and methods

Patients who underwent either proximal arthroscopic and open subpectoral biceps tenodesis for isolated superior labrum or long head of the biceps lesions with a minimum follow-up of 18 months were evaluated with the Constant score, new LHB score and physical examinations including O'Brien test. Patients undergoing a concomitant rotator cuff, labral repair or with shoulder osteoarthritis, shoulder stiffness, shoulder instability, distal biceps tendon lesions and previous operations on the contralateral shoulder were excluded.

Results

Thirty-two patients (16 proximal arthroscopic, 16 open subpectoral) with an average age of 59.3 years (range 47–71 years) were evaluated at a mean follow-up of 22.3 months (18.1–32.4 months). Two patients in proximal arthroscopic group developed a Popeye deformity. There was no significant difference in mean Constant score between the proximal arthroscopic and open subpectoral groups (88.9 vs 92.3; $p = 0.42$); similarly, there was no significant difference in LHB score between the groups (89.7 vs 90.1; $p = 0.73$). There were no complications in the open subpectoral group. There was one complication in the proximal arthroscopic group. It was synovial fistula in place of arthroscopic tenodesis portal that regressed spontaneously.

Conclusions

Biceps tenodesis remains a reliable treatment for pathological abnormality of the long head of the biceps. Patients undergoing an arthroscopic proximal tenodesis on the top of the bicipital groove showed similar pain relief and clinical outcomes as compared with patients undergoing open subpectoral tenodesis. Nevertheless, it appears that open subpectoral biceps tenodesis provides stronger stabilization, allows early aggressive rehabilitation, reduces the risk of postoperative shoulder stiffness and prolonged postoperative pain. It also seems that the type of biceps pathology should be taken into account in the treatment planning.

Keywords: shoulder, long head of the biceps tendon, subpectoral tenodesis, arthroscopic surgery

THE IMPACT OF KINESIOTAPING ON SHOULDER FUNCTION IN THE ANTERIOR, RECURRENT TRAUMATIC SHOULDER INSTABILITY

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Introduction

The glenohumeral joint instability is associated with minor control over extremity and proprioception deficits. Application of kinesiotaping may lead to the better joint stabilization, normalization of muscle and fascial tension, the mobility improvements. This can correct joint action, including function of proprioception.

Aim

The evaluation of the kinesiotaping impact on the joint position sense and on functioning of the extremity in cases of the glenohumeral joint instability.

Material and methods

The study was carried on 30 people, diagnosed with glenohumeral joint instability (8 women and 22 men, the average age was 26 years). The control group consisted of 35 healthy volunteers (9 women and 26 men, the average age was 24 years). Proprioception (the examination of active reproduction of the joint position sense) with use of electric goniometer (proprio-meter) was executed in both groups. In addition, a group of patients filled twice, before and after the therapy, the form for Western Ontario Shoulder Instability Index.

Results

The result of the active reproduction error of the joint position (EARJP) for flexion and abduction in examined positions for the group of people with glenohumeral joint instability was greater than for the control group. Analysed application of kinesiotaping showed no significant effect on the error of the active reproduction of the joint position for people with glenohumeral joint instability. Applied kinesiotaping had significantly improved the shoulder functioning which was evaluated by Western Ontario Instability Shoulder Index results.

Conclusions

Subjects with the shoulder instability showed proprioception shortages during the test of joint position sense and lower extremity function in everyday activities. Analysed application can be used to improve the function of the extremity.

Keywords: anterior shoulder instability, joint position sense, kinesiotaping, Western Ontario Shoulder Instability Index

STIFF SHOULDER

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Introduction and aim

Stiffness of the shoulder is a clinical symptoms (mainly by means of limitation of the range of motion) that can occur either through muscle weakness (such as a rotator cuff tear) or through postoperative adhesions (rotator cuff repair), but the “true stiffness” is due to the condition called “frozen shoulder”. There is important difference between those conditions, what is often not appreciated by the clinicians. Proper diagnosis is crucial for the treatment choice. The aim of this presentation was debate on stiff shoulder.

Material and methods

Literature on frozen shoulder and rotator cuff repair complications was reviewed and compared with own personal material as well as experiences.

Results

Frozen shoulder can be either primary (idiopathic) or secondary (due to trauma, cardiovascular disease, hemiparesis or diabetes). Management of frozen shoulder can be either conservative or surgical. There is consensus in the literature that there is a need of multidisciplinary approach in conservative treatment (utilizing orthopedic surgeons, physiotherapists, psychologists and internal medicine doctors). Conservative treatment can consist of physiotherapy, intra-articular steroid injections, intra-articular high volume injections and oral steroid therapy. Interventional treatment such as manipulation under anesthesia or arthroscopic capsular release should be reserved for the cases when conservative treatment is ineffective. Secondary frozen shoulder is considered to be more refractory for conservative treatment. Although there is lack of consensus in the literature how to manage with stiff shoulder and with rotator cuff tear rehabilitation before the surgery (as a preparation for the surgery) as well as the special postoperative exercises are advocated as a treatment of choice.

Conclusions

Proper diagnosis (defining the cause of the stiffness) is very important for the treatment choice. Frozen shoulder should be treated conservatively and interventional therapy is advocated when the conservative treatment fails. Stiff shoulder with rotator cuff tear should be “prepared” for the repairing surgery by introducing the physiotherapeutic program first. Management of postoperative stiffness consists of a traumatic surgical approach and introduction of the special rehabilitation program.

Keywords: shoulder, stiffness, complications

TIPS AND TRICKS IN SHOULDER EXAMINATION

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Introduction and aim

Complexity of the shoulder anatomy and spectrum of disorders make the shoulder examination a real challenge for the surgeon. Clinicians should be aware that in some shoulder pathologies, the sensitivity of ultrasound and MRI diagnostics is low and makes the physical examination a crucial guiding tool in undertaking the decision about ways of treatment.

Material and methods

Literature on shoulder physical examination and shoulder special tests was reviewed and compared with own personal material as well as experiences.

Results

Suggested physical examination protocol should consist of creating the careful patient's medical history and properly chosen methods of clinical examination. Four principles of clinical examination are: look, touch, move and application of special tests. There are numerous shoulder special tests described in literature for each pathology with different specificity and sensitivity.

Conclusions

Different patient's complaints, like shoulder instability, weak strength, lack of smoothness (as a symptom of a gleno-humeral arthrosis) and stiffness (limitation of the range of motion) and complexity of clinical examination makes the physical examination challenging and time consuming. Methodical examination and using the shoulder's evaluation tests with highest sensitivity and specificity will make the diagnosis most accurate and will reduce the time of examination.

Keywords: physical examination, shoulder, special tests

SPORT INJURY AND OVERUSE SURVEILLANCE IN HANDBALL – REVIEW OF SYSTEMS AND NEW PROPOSAL. PRELIMINARY RESULTS: INTERNATIONAL FRIENDLY MEN'S HANDBALL TOURNAMENT AND WOMEN HANDBALL CHAMPIONSHIP 2015

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Introduction

Handball is associated with a high risk of time loss because of injuries. Considering a different injury definition, the overall incidence is around 8–9 injuries/1000 training hours. This is why the effective prevention is so important. Before preventive actions which can be suggested for sports injuries, a solid surveillance system is required in order to study their etiology, risk factors and mechanisms.

Aim

We would like to present straightforward register of Sports Injury and Overuse Monitoring System (SIOMS) and preliminary data from International Friendly Men's Handball Tournament and Women's Handball Championship.

Material and methods

A new injury and overuse injury registration system was developed as a mobile application. It was used by Polish Medical Team during two handball tournaments.

Results

SIOMS has already been used by Polish International Handball Teams during International Friendly Men's Handball Tournament in Gdańsk and Women's Handball Championship in Denmark. Preliminary results are: 7 acute and 3 overuse injuries during men's tournament (2 games) and 3 acute injuries in women's championship tournament (6 games).

Conclusion

There are several injury surveillance programs regarding handball and other sports in the literature. SIOMS system takes into account the prevention and could be a great source of information about its effectiveness. In order to be helpful not only for the team physi-

cians but also for the couches and team managers, our report form contains information about the diet and types of training which can influence the time loss caused by injuries.
Keywords: injury, overuse injury, surveillance, handball

SHOULDER ISOKINETIC PROFILE IN YOUNG NON-ATHLETES

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Introduction

The glenohumeral joint is one of the most complicated structures of human body. It allows one to perform complex movements in all planes. In the literature, there are few studies on the shoulder isokinetics in non-athletes. Usually, the research concerns the throwing shoulder in young athletes.

Aim

The aim of the study was to evaluate the isokinetic profile of normal shoulder in external and internal rotation.

Material and methods

Thirty volunteers with healthy shoulders (16 women and 14 men, aged 20–25 years) were tested using the Biodex® dynamometer. Internal and external rotation of the shoulder at 90°/sec, 180°/sec, 270°/sec, 360°/sec angular velocities were tested.

Results

In statistical analysis, peak torque, average power, total work and agonist-antagonist ratio were taken into consideration. The results showed that all parameters were higher in dominant extremities.

Conclusions

The peak torque value for the dominant extremity is greater than for the non-dominant one. Dominant extremity internal rotators' peak torque is greater than external rotators' peak torque both in dominant and non-dominant extremities. The results of average power and total work in external rotation are always higher in the dominant extremity. The agonist-antagonist ratio of internal to external rotators oscillates within the range of 68.8–85.8% and was higher in dominant extremity. Total work value depends on the number of movements. Muscles' total work increases with the increase in the number of movements. The limitation of this study was a poor age distribution. The results could be useful for further research as normative data for healthy shoulders.

Keywords: shoulder, isokinetic profile, external and internal rotation

HOW TO ACHIEVE SHOULDER STABILITY AFTER DISLOCATION WITHOUT OPERATIONS?

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Introduction

Glenohumeral joint (GHJ) is the most mobile joint of human body and it is very often dislocated. Most dislocations occur because of trauma in 95%, where in 98% the humeral head (HH) translates anteriorly, what is known as an anterior glenohumeral dislocation. Some authors believe the most common is Bankart lesion (85%) of traumatic instability cases, others that Hill- Sachs lesions (80%). The second dislocation concerns people aged 20 years and younger (66–97%) as well as 40 years and older (0–21%).

Aim

To study the relationships between stability exercises and proprioceptive exercises and shoulder stability.

Material and methods

A bibliographic review was performed in the EBSCO databases and in the PubMed database with the following keywords: “shoulder”, “glenohumeral joint”, “stability” and “proprioception”. We selected articles assessing the proprioception and stability exercises of individuals with the shoulder dislocation, written in English and published between 2005 and 2015.

Results

The traditional rehabilitation has only 20% possibility of success. We can accomplish the shoulder stability by rehabilitation divided into three stages: stability exercises, closed-chain exercises and open-chain exercises. The external assistance may be used to help in rehabilitation such as: swiss balls, dura discs, balance boards, body blade. It seems that the best exercises are those which stabilize HH. Muscles which centralize HH are: rotator cuff, deltoideus, long head of biceps, muscles stabilizing scapula.

Conclusions

Integrated rehabilitation for the shoulder combined with the corresponding stability and proprioceptive exercises seem to be an effective treatment for stabilizing the glenohumeral joint. Further research in this area is needed.

Keywords: shoulder dislocation, stability exercises, proprioception

OSTEOPATHIC TREATMENT FOR THE TENNIS ELBOW (LATERAL EPICONDYLITIS)

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Introduction

Osteopathy is method of a clinical diagnosis and a treatment, based on the study of nervous system and the musculoskeletal system. Osteopathy is valuable in a complex treatment aiming to improve the clinical status of patient. Lateral epicondylitis is a chronic tear usually in the origin of the extensor carpi radialis brevis muscle. It is the most common elbow complaint. It results from repetitive use of the wrist extensors in about 90% of the patients.

Aim

To investigate if osteopathic treatment may help to cure the tennis elbow.

Material and methods

A bibliographic review was performed in the EBSCO database and in the PubMed database with the following keywords: “tennis elbow”, “lateral epicondylitis”, “osteopathy” and “manual therapy”. We selected articles written in English and published between 1999 and 2015.

Results

The tennis elbow tends to be a chronic problem. Many times the treatment failure is due to missed breakdowns in the kinetic chain. The first place to look and treat in the kinetic chain is the cervical spine. Identifying and treatment the somatic dysfunction in the neck, thorax, scapula and ribs, most notably in the C7-Th1-first rib complex can be effective. Muscles which should be diagnosed are: trapezius, levator scapulae, scalenes, sternocleidomastoids. Most epicondylitis is related to restriction of the radial head at the radiohumeral and proximal radio-ulnar joint. Osteopathic techniques should target those joints. The following osteopathic techniques are useful in the treatment of tennis elbow: mobilization, manipulation, energization of muscle, myofascial release, counterstrain.

Conclusion

The efficient treatment should further include the osteopathic treatment to cure the tennis elbow. Further research in this area is needed.

Keywords: osteopathy, tennis elbow, lateral epicondylitis, manual therapy

BICEPS TENOTOMY AND TENODESIS

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Aim of the study

Pain in the early postoperative period after rotator cuff (RC) arthroscopic repair with biceps tenodesis is a common problem. We present this lecture to determine how the opening of bicipital groove during intraarticular tenodesis influences the pain sensation after the surgery.

Materials and methods

During the period from 2013 to 2015 we performed 272 biceps tenodesis as a part of small and medium RC ruptures repair. In 176 (group A) we performed intraarticular biceps tenodesis with the suturing using bioabsorbable anchors without opening the intertubercular groove. For rest 96 (group B) we used same fixation and opened intertubercular groove till the superior margin of the pectoralis tendon with debridement the groove to the bleeding bone and removing of the ligament sheath. Medication list and rehabilitation procedures were the same in both groups. The pain level was measured by VAS during first 4 weeks after the operation.

Results

Day p/o	Group A (mean VAS)	Group B (mean VAS)
1	2.3 (range 2–3)	3.5 (range 3–6)
6	2.1 (range 2–3)	4.0 (range 3–5)
14	1.8 (range 1–3)	3.5 (range 3–4)
30	1.4 (range 1–2)	2.8 (range 2–4)

Conclusion

Opening of bicipital groove and removing of biceps sheath decrease pain syndrome in the early postoperative period after RC repair with biceps tenodesis.

Keywords: biceps tenodesis, rotator cuff repair, bicipital groove

MANAGEMENT OF COMPLICATIONS AFTER ROTATOR CUFF SURGERY

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Introduction and general aim

Rotator cuff surgery changed dramatically since the systematic use of arthroscopic tools in the management of repair. Many factors such as the understanding of the anatomic details, the understanding of the natural history of the rotator cuff disease and the augmentation of the volume in the studies dedicated to this field of orthopaedics contributed to a better service for the patients and the improvement in the quality of life and in the patients comfort before, during and after surgery. A vast diversity of tools were developed to help and assist the surgeon in the management of an impaired shoulder and the volume of the surgeries performed all over the world increased exponentially. So did the complications with this surgery!

Results

A repository of complications published in 2015 from Schultess Clinic (Audigé *et al.*) included 233 full-text papers and discovered that 242 different terms were used to define different complications after cuff repair. Strauss *et al.* write about postoperative complications after arthroscopic cuff repair ranging from 2.5% to 11.9% in different studies and deplores a lack of specific definition. Randelli *et al.* describe shoulder stiffness as the major complication after cuff repair and occurrence in between 1.5 and 11.5%. According to Brislin *et al.*, a complication is a postoperative event or condition that requires additional treatment, either nonoperative or operative.

Discussion

The current report provides examples of different complications related directly to cuff repair surgery. Infection, problems with the Deltoid insertion, Cuff tear recurrence, Superior

or Anterior humeral head migration, Instability, Stiffness and Pseudo-paralytic shoulder are different conditions that could show after or as a result of cuff repair. Each condition is described and defined as well as possible methods for management, operative or non-operative. Some of the conditions are directly shown as I managed from practice, others were findings from the literature that I had not yet experienced such as nerve impairment or complications related to anesthesia or to the patient positioning in the operating theatre. Some conditions related to material are also outlined such as complications related to anchors or to the suture material.

Conclusions

Overall this presentation encourages surgeons to pursue the cuff repair as option for the management of cuff tears but also underlines the fact that an average of 10% of the cases could result in complications that will need operative or non-operative management and the patient should be aware of that before accepting the procedure proposed. The most common complication is stiffness and in current practice the occurrence of post-operative stiffness is not exceptional mostly in patients with associated comorbidities such as diabetes or degenerative muscular disease that may be related to smoking or hypoxia. A general assessment of the patient before surgery that should be concentrated on the diagnosis of the cuff condition is mandatory as the best way to prevent complications.

Keywords: rotator cuff surgery, management of complications

THE RESULTS OF TREATMENT OF ANTERIOR SHOULDER INSTABILITY USING ARTHROSCOPIC LATARJET PROCEDURE

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Introduction

Increasing number of studies on arthroscopic Latarjet technique in recent years confirms its' efficiency equal with open procedure with less postoperative complications. We present own results of 5-year experience in using this method.

Aim

The aim of the study is to present outcomes of treatment of anterior shoulder instability with arthroscopic Latarjet procedure and confirm its' safety, reproducibility and efficiency.

Material and methods

In years 2009–2014, we performed 112 arthroscopic Latarjet procedures. The mean time from the first dislocation to surgery was 5,16 years. 19 patients had examination performed prior surgery on examined shoulder. In 15 cases other procedures were performed during surgery. The mean follow up period was 25 months. Instability recurrence, complications and limitation of the range of motion were assessed at pre-op examination and the last follow-up. Patients were evaluated with Walch-Duplay, Rowe score and a specially designed Screw-Subscap Conflict Test.

Results

Eighty-four patients were available at minimum 8 months follow-up examination. There were 2 cases of re-dislocations associated with the high energy trauma. One case of superior screw bending without dislocation due to direct trauma was found. One patient complained of sensation of instability. In 6 cases the screw removal was necessary due to positive Screw-Subscap Conflict Test. No neurological complications were observed. Statistically significant improvement of range of motion, Walsh-Duplay and Rowe scores were observed.

Conclusions

Arthroscopic Latarjet procedure is efficient in treatment of anterior shoulder instability as the open procedure. Moreover, it is less invasive and provides possibility to simultaneous concomitant lesions in the shoulder joint.

Keywords: anterior shoulder instability, arthroscopic Latarjet procedure

ARTHROSCOPIC ENDOBUTTON STABILIZATION FOR ACUTE AND CHRONIC ACROMIOCLAVICULAR JOINT INSTABILITY

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Introduction

Operative treatment for acromioclavicular joint (AC) injuries remains controversial and multiple surgical techniques have been reported so far.

Aim

The aim of the study was to evaluate the clinical results of arthroscopic stabilization of acute and chronic AC joint instability.

Material and methods

The study involved 46 patients (41 men, 5 women) undergoing the arthroscopic endobutton stabilization of acute and chronic AC joint instability in 2009–2015. The average age was 40 years (range 23–63). Instability resulted mostly from directly fall ($n = 22$) and sport injury ($n = 8$). The main symptoms were pain ($n = 46$; 100%), ACJ vertical or horizontal instability ($n = 44$; 95%) and limited ROM. Indication for surgery was type III ($38 = 79\%$), type IV ($6 = 12\%$) and type V ($4 = 8\%$) injury. Clinical evaluation also included SST and UCLA scores.

Results

At the final follow-up, 40 (87%) patients were painless and 43 (93%) AC joints remained stable. ROM increased to from 148° to 174° in flexion and from 146° to 173° in abduction. External rotation decreased non-significantly from 60° to 51° . The mean scores increased from 15.5 to 29.2 of UCLA and 3.7 to 9.3 of SST. Two patients required re-operation due to failure of the fixation (rupture of the suture linking 2 endobuttons, endobutton and suture cutting the medial cortex of the coracoid). Ultrasound scans and X-rays in some cases revealed AC joint widening despite preserved CC distance.

Conclusions

Arthroscopic technique with endobutton fixation seems to be effective in treatment of AC joint instability, providing good function of the shoulder.

Keywords: arthroscopic endobutton stabilization, acromioclavicular joint instability

CUSTOM-MADE HINGED SPACER FOR THE TOTAL ELBOW SEPTIC LOOSENING

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Introduction

Elbow TJP has the highest rate of complications among all TJP. Removal of an elbow total joint implant due to the septic loosening is a major problem and may result in floating, unstable elbow. Stability may be regained by casting or hinged orthosis.

Aim

In order to prevent massive scarring within “empty” elbow, ligament shortening and muscle atrophy, it has been developed a hinged, non-constrained, an on-site and self-made elbow spacer.

Material and methods

The custom-made hinged spacer has been used in three patients (treated between 2006 and 2009) for the total elbow septic loosening of Stryker Solar implant. Method of spacer molding and a natural wear of an “implant” is described. Final results of secondary TJP are presented.

Results

Staged TJP after removal of an infected TJP of the elbow with antibiotic impregnated spacer gives finally the satisfactory range of motion with the spacer and final TJP. Visible wear of cement, cracks and distal migration of trochlea have been observed with time.

Conclusion

The hinged, non-constrained elbow spacer preserves mobility, stability, allows improving the exercise range of motion after removal of an infected TJP of the elbow. This may be considered as an alternative to simple hardware removal or one stage procedure.

Keywords: custom-made spacer, total elbow arthroplasty, septic loosening

ARTHROSCOPIC RELEASE OF EXTRINSIC ELBOW CONTRACTURE-RECOVERY AND FINAL RESULTS

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Introduction

Elbow stiffness substantially limits function of the upper extremity, resulting from both traumatic and degenerative aetiology.

Aim

The aim of this study was to evaluate the range of motion recovery and final outcome of patients after the arthroscopic elbow release.

Material and methods

Study was based on 44 consecutive patients with the arthroscopic elbow release followed prospectively for at least 6 months. All patients were operated by one surgeon, between 2010–2015. The group included 9 females, 35 males, mean age $36,2 \pm 12,8$, mean follow-up $18,5 \pm 17,7$ weeks, with extrinsic elbow contracture resulting from trauma (22)

and osteoarthritis (22). Mayo Elbow Performance (MEP) score was used for functional evaluation preoperatively and at final follow-up. Majority of contractures were minimal (21 patients) and moderate (17 patients).

Results

The average ROM improved significantly in the final follow up by: extension 13.8°, flexion 11.7°, arc 28.3°. Significant improvement in arc has been achieved in both severity groups, however larger in moderate contracture. Best improvement was achieved intraoperatively, then it decreased within 1 week and finally improved over recovery time. Final extension was significantly lower than range achieved intraoperatively. Improvement in ROM was similar in both traumatic and degenerative contractures. MEP improved significantly from 73.5 ± 12 to 92.2 ± 15.3 . There was one complication of resulting in mild median nerve neuropathy.

Conclusions

Arthroscopic elbow release improves significantly range of motion and function in minimal and moderate elbow contractures also improving overall function. It is equally successful in posttraumatic and degenerative aetiology of stiffness. Intraoperative improvement may not be achieved once the treatment is accomplished.

Keywords: elbow contracture, elbow stiffness, arthrolysis, arthroscopy, joint release

CURRENT CONCEPTS IN REVERSE SHOULDER ARTHROPLASTY

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Introduction

Due to the difficulties in revision of total shoulder arthroplasties (TSAs), especially in revision of a well-fixed stem (cementless or cemented), surgeons look for ways to overcome these difficulties.

Aim

In this report, it was aimed to expose the surgical procedures towards reverse total shoulder arthroplasty basing on own experience and by a review of relevant literature on this topic.

Material, methods and results

Description of the implants, stemless metaphyseal cementless fixation, surgical techniques, clinical and radiographic results, complications as well as late post traumatic (due to the falls) periprosthetic fractures are provided in cases of patients after the total shoulder arthroplasties.

Conclusions

The bone preserving short metaphyseal rTSA design without a stem shows encouraging short to midterm results with excellent pain relief and shoulder function, restoration of good active range of motion and high patients' satisfaction scores. Radiographically, no implant loosening, subsidence or stress shielding are usually observed. The design of this implant seems to result in low incidence of glenoid notching (with low grade of notching) and improved rotational movements compared to the Grammont type prostheses.

Keywords: reverse total shoulder arthroplasty, replacement

REVERSE TOTAL SHOULDER ARTHROPLASTY FOR CUFF ARTHROPATHY IMPROVES SHOULDER PROPRIOCEPTION

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Introduction

Joint replacement affects the proprioception, as it was shown in knee, elbow and shoulder studies.

Aim

The aim of this study it was to evaluate the shoulder proprioception following reverse total shoulder arthroplasty (rTSA) in patients with cuff arthropathy.

Methods

Twenty-nine patients that underwent unilateral rTSA (19 women, 10 men) and 31 healthy volunteers as a control group were evaluated for the joint position sense (JPS) of the shoulder using the dedicated high accuracy electronic goniometer. Error of active reproduction of joint position (EARJP) was assessed at reference positions of 30°, 60°, 90°, 120° for forward flexion and abduction; 15°, 30°, 45° for internal (IR) and external (ER) rotation in rTSA, contralateral non-operated and control shoulders. Range of motion of shoulder (ROM), shoulder strength, constant score, Active Daily Living External Rotation (ADLER) score were also assessed.

Results

Results of EARJP for rTSA, contralateral and control respectively were as follows:

- Forward flexion
 - at 30° = 8.0 ± 5.7; 9.8 ± 6.1 and 4.9 ± 3.0;
 - at 60° = 5.0 ± 2.8; 5.9 ± 2.7 and 5.1 ± 3.2;
 - at 90° = 3.1 ± 1.6; 5.5 ± 2.6 and 3.2 ± 1.4;
 - at 120° = 3.4 ± 2.1; 5.6 ± 4.0 and 3.5 ± 1.7;
- Abduction
 - at 30° = 5.2 ± 2.5; 9.1 ± 6.1 and 4.6 ± 2.3;
 - at 60° = 5.2 ± 3.6; 6.6 ± 4.1 and 5.3 ± 3.1;
 - at 90° = 3.8 ± 2.0; 7.4 ± 5.5 and 4.1 ± 1.9;
 - at 120° = 5.3 ± 2.9; 7.7 ± 5.3 and 4.2 ± 1.9;
- Internal rotation
 - at 15° = IR 4.3 ± 3.1; 6.2 ± 4.4 and 2.8 ± 1.2;
 - at 30° = 3.2 ± 1.9; 4.5 ± 2.3 and 3.3 ± 1.4;
 - at 45° = 3.5 ± 2.0; 4.1 ± 1.8 and 2.8 ± 1.0;
- External rotation
 - at 15 = 3,0 ± 1,7; 4,2 ± 2,2 and 3,6 ± 1,4;
 - at 30° = 3,1 ± 1,5; 3,8 ± 2,6 and 3,4 ± 1,6.

The results showed significantly better JPS (lower EARJP) in shoulders following rTSA and normal control shoulders comparing to the patients' contralateral shoulders. The explanation can be that rTSA improves joint kinematics and stability, which allows better

muscular performance and proprioception feedback. Significant correlations between clinical scores and JPS in rTSA shoulder have been found: negative correlation of ADLER and EARJP at 30° of abduction and at 15° of IR; negative correlation of CS with EARJP at 30° of flexion, 45° of ER and at 30°IR.

Conclusions

Treated shoulders following rTSA show JPS are superior to non-operated contralateral shoulders and comparable to shoulders of healthy population. It seems that rTSA restores the shoulder proprioception. Better shoulder function can be assessed by the above scores correlated with the shoulder proprioception results.

Keywords: reverse total shoulder arthroplasty, cuff arthropathy, shoulder proprioception

HISTORY OF SHOULDER SURGERY IN POLAND FROM 1862 TO 1989

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Introduction

The revue describes the beginnings and development of shoulder surgery in Poland from 1862 to 1989 based on the scientific literature. Discussions on shoulder problems first appeared in Polish medical literature in the eighteenth century. Since then, a significant body of knowledge on diagnoses and various methods of treatment have been obtained, especially over the last decades. Some of them are the results of pioneering work by Levittoux, Dega, Wahl and Sołtysiak. However, the dominant influence on the development of the field has always been in Western Europe.

Aim

In this review, a chronological development of shoulder surgery is tracked in order to better understand the subsequent development of methods in treatment.

Materials and methods

This revue aims to provide a historical overview of the diagnostics and surgical treatment of shoulder problems, supplemented with an analysis of articles from Polish publications (Przegląd Lekarski 186–1928, Chirurgia Narządu Ruchu 1928–1989) as well as articles included in the PubMed database since its beginning till 1989. We found 270 articles published in Polish papers while in PubMed there are 12509 articles from all round the world.

Results

One of the first clinical description of shoulder surgery was written by A. Obalański, MD in 1867. Of vital importance in this field there were the years preceding the Second World War, when Levittoux published a description of his own method of shoulder instability surgery and was followed by Polish surgeons. At the same time, Polish surgeons adopted and slightly modified the procedures used all round the world. Since the first publication on shoulder surgery in 1884, various techniques have been developed, some of which have been forgotten while some are still in use.

Conclusions

The introduction of medical technologies was a turning point in the development the diagnostics and treatment of shoulder problems. For a long time Poland was trying to

catch up with the world in using the new surgical procedures, however, now it can be a world leader in the shoulder surgery.

Keywords: shoulder surgery, history

SHOULDER ARTHROPATHY SECONDARY TO SYRINGOMYELIA – SYSTEMATIC REVIEW AND CASE SERIES

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Introduction

Syringomyelia is quite rare spinal cord disease with cavity called syrinx destroying its substance. It affects mostly cervical segments and causes 25% of arthropathy being the most common etiology of neuropathic arthropathy of the upper extremity. Shoulder is the most exposed joint in syringomyelia. The condition is rare and therefore there have been no guidelines in literature to diagnose and treat patients with neuropathic shoulder in syringomyelia.

Aim

To perform systematic review of the literature concerning the patients with shoulder arthropathy in syringomyelia including own case series.

Material and methods

PubMed 1966–2015, Embase 1980–2015, the Cochrane Database of Systematic Reviews, and the Cochrane Central Register of Controlled Trials databases were searched for neuropathic shoulder in Syringomyelia. We have found 21 papers, all being case reports. We have added our own series of 6 patients.

Pooled data revealed 38 cases (mean age 50.5). Analysis was based on epidemiological data, symptoms, clinical examinations, diagnostic tests, treatment methods and their effectiveness.

Results

84.21% patients had monolateral arthropathy. The most common symptoms were: range of motion limitation (97.4%), swelling (92.1%), weakness (89.5%), typical sensory loss (79%) and pain (73.7%). Advanced shoulder destruction was observed in 35 of 38 patients. In every patient diagnosis was confirmed by MRI with syrinx in spinal cord. 8 patients were treated surgically (1 arthrodesis and 7 arthroplasties) with good early result.

Conclusion

Syringomyelia is a rare condition. Patients typically present with limited motion and swelling of the shoulder accompanied by typical sensory loss and often pain. Radiological picture shows advanced joint destruction. Diagnosis is confirmed by MRI of cervical spine.

Keywords: shoulder arthropathy, syringomyelia

ZESPOŁOWE PODEJŚCIE DO LECZENIA PIERŚCIENIA ROTATORÓW

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Przerwanie ścięgien pierścienia rotatorów stanowi istotny odsetek uszkodzeń w obrębie barku. Uszkodzenia te można podzielić na dwa najczęściej występujące typy. Pierwszy z nich to zastarzałe uszkodzenia przeciążeniowe, najczęściej spotykane w starszej grupie pacjentów, które mogą być nawet bezobjawowe. Drugi to świeże, urazowe przerwanie ścięgna, najczęściej wiążące się z dużymi dolegliwościami bólowymi. Występują też sytuacje w których ścięgno już osłabione zwyrodnieniowo ulega niewielkiemu razowi i dochodzi do jego zerwania.

W przypadku chorych z zastarzałym, nienaprawialnym przerwaniem któregoś ze ścięgien, najczęściej prowadzi się leczenie zachowawcze mające na celu zmniejszenie dolegliwości bólowych i uzyskanie satysfakcjonującej funkcji stawu. We wczesnym etapie stosuje się podanie iniekcji steroidowej w okolice kaletki podnaramiennej oraz rozpoczęcie ćwiczeń wspomaganych zwiększających zakres ruchomości, a także terapię manualną tkanek miękkich. Bardzo ważna jest również prawidłowa praca łopatki, z jednej strony jej stabilizacja, a z drugiej przywrócenie rytmu ramiennieo-łopatkowego. W kolejnym etapie, najważniejszymi celami usprawniania są wzmocnienie przedniej części mięśnia naramiennego, bez którego wykonywanie jakichkolwiek czynności przed ciałem jest dla pacjenta bardzo trudne oraz wzmocnienie mięśni obniżających głowę kości ramiennej w panewce, aby zapobiec pojawieniu się konfliktu w przestrzeni podbarkowej.

U pacjentów po świeżym uszkodzeniu pierścienia rotatorów, powinno stosować się leczenie operacyjne – reinsertję ścięgna. W pierwszym okresie pooperacyjnym, kiedy stosowane jest unieruchomienie (4–6 tygodni) należy pamiętać o ćwiczeniach łokcia, nadgarstka i palców oraz napięciu izometrycznym mięśni nieobjętych operacją. Po tym czasie wprowadzane są ćwiczenia zakresu ruchu, prawidłowego toru ruchu łopatki i stopniowo ćwiczenia czynne oraz oporowe ze szczególną ostrożnością w przypadku mięśnia, którego ścięgno zostało naprawione. Nie należy zapominać o prawidłowym balansie mięśni obniżających głowę kości ramiennej w stosunku do mięśnia naramiennego, który jeśli jest w przewodzie, może spowodować jej migrację górną.

Na każdym etapie leczenia pacjenta z uszkodzeniem pierścienia rotatorów, niezwykle ważna jest współpraca lekarza i fizjoterapeuty, ponieważ tylko ich wspólne działanie może dać dobry ostateczny wynik funkcjonalny.

Słowa kluczowe: uszkodzenie pierścienia rotatorów, usprawnianie, leczenie operacyjne

BADANIE KLINICZNE BARKU**Piotr Czarnecki****Katedra i Klinika Traumatologii, Ortopedii i Chirurgii Ręki, Uniwersytet Medyczny im. Karola Marcinkowskiego w Poznaniu****piotr_czarnecki@tlen.pl**

Mimo znacznego postępu w dziedzinach obrazowania, badanie kliniczne poparte wywiadem pozostaje w mojej opinii najważniejszym składnikiem dobrego rozpoznania klinicznego, umożliwiając w ten sposób dobranie odpowiedniej metody leczenia. Pozwala nawiązać więź z pacjentem, upewnia o zaangażowaniu w leczenie oraz dostarcza istotnych informacji, mogących znaleźć potwierdzenie w wynikach obrazowania.

Wywiad pozwala na ustalenie czasu trwania, charakteru oraz ewentualnej przyczyny dolegliwości. W trudniejszych sytuacjach dostarcza informacji, co do wcześniejszego leczenia włącznie z ewentualnymi nieprawidłowościami w tym zakresie i pokazuje nastawienie pacjenta do procesu leczenia. Pozwala również ustalić oczekiwania pacjenta, jego potrzeby zarówno zawodowe jak i poza pracą (hobby, sport). W patologii barku szczególnie zwracamy uwagę na charakter i okresy występowania bólu (w nocy, podczas ruchu) oraz jego lokalizację (konkretna lub rozproszona, promieniująca).

W badaniu przedmiotowym rozpoczynam od oglądania (zmiana koloru skóry, występowanie obrzęku lub zaniku, blizny po dostęпах operacyjnych), następnie badam dotykiem (palpacyjnie), szukając bolesności lub zmian w obrysie barku. Niezwykle istotne jest badanie biernego i czynnego zakresu ruchu i ich wzajemna relacja oraz tor ruchu z ewentualnymi jego nieprawidłowościami (sztywność, wczesne uruchamianie łopatki, „omijanie” bólu). Po tej części wykonuję testy specyficzne dla danego schorzenia (określonego w wywiadzie); w problemach przestrzeni podbarkowej i rotatorów- testy Neera i Hawkinsa, w patologii stożka rotatorów – testy Jobe’a, „belly-press”, „lift-off”, „lag sign”, a patologii ścięgna głowy długiej m. dwugłowego – test O’Briena, test Speeda. W przypadkach niestabilności przeprowadzam test obawy przedniej i relokacji, a w przypadku niestabilności wielokierunkowej z wiotkością często testy szuflady oraz rowka. W sytuacjach specyficznych możemy wykryć dodatkowe patologie, takie jak ruchomość patologiczna (staw rzekomy), odstawanie łopatki (dysfunkcja nerwu piersiowego długiego), „przeskakiwanie” łopatki.

Badanie należy uzupełnić przez ocenę siły mięśniowej wg skali Lovett’a oraz ocenę percepcji uczucia, zwłaszcza w zakresie nerwu pachowego (z lokalizacją badani w bocznej stronie barku).

Słowa kluczowe: badanie barku, testy kliniczne, zakres ruchu barku

METODY OBIEKTYWNEJ OCENY BARKU**Monika Grygorowicz^{1,2}****¹Rehasport Clinic, Poznań****²Zakład Fizjoterapii Państwowej Wyższej Szkoły Zawodowej im. Stanisława Staszica, Piła
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Obiektywne metody pomiaru coraz częściej wykorzystywane są w trakcie diagnostyki, oceny skuteczności postępowania zachowawczego czy operacyjnego, a zasada *Evidence Based Medicine* powinna być kluczowa przy doborze środków i metod terapeutycznych. W dysfunkcjach kompleksu barkowego stosuje się wiele różnych narzędzi oceny. Jednakże nawet, jeśli większość z tych ocen jest powszechna, to nie stworzono uniwersalnego standardu takiej oceny. Celem pracy jest przedstawienie zasad prowadzenia obiektywnych testów diagnostycznych z wykorzystaniem różnorodnych urządzeń. Omówione zostaną

warunki przeprowadzenia pomiarów w oparciu o analizę mocy, momentu siły i pracy mięśniowej w warunkach izokinetycznych, ocenę propriocepcji czy prędkości rzutu. Na podstawie aktualnych doniesień naukowych oraz praktyki własnej, dokonana zostanie analiza czynników wpływających na wyniki badania, wiarygodność i rzetelność przeprowadzonych testów. Przekazane informacje mogą być przydatne we właściwej interpretacji uzyskanych wyników oraz mogą być pomocne we właściwym wykorzystaniu testów w diagnostyce i terapii dysfunkcji kompleksu barkowego.

Słowa kluczowe: diagnostyka barku, obiektywizacja, izokientyka, propriocepcja

BIOMECHANIKA BARKU

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Obręcz barkową tworzą stawy ramienny, barkowo-obończykowy, mostkowo-obończykowy, połączenie łopatkowo-piersiowe oraz przestrzeń podnaramienna wraz z otaczającymi je więzadłami i mięśniami. Wszystkie te elementy zapewniają wspólnie doskonałą integrację, koordynację i synergię, które są niezbędne dla osiągnięcia balansu pomiędzy stabilnością a mobilnością, charakteryzującą obręcz barkową.

Zaburzenia w obrębie barku są jednymi z najczęstszych przyczyn bólu mięśniowo-szkieletowego i niesprawności. Ból barku jest trzecią najczęstszą przyczyną zaburzeń układu mięśniowo-szkieletowego zaraz po dolegliwościach bólowych dolnego odcinka kręgosłupa i odcinka szyjnego. Degeneracja, infekcje, stany zapalne, zmiany zwyrodnieniowe, urazy, choroby naczyniowe, nowotwory, neuropatie czy ból przeniesiony, mogą wywoływać dolegliwości bólowe barku.

W obrębie barku może wystąpić wiele zaburzeń, począwszy od uszkodzenia pierścienia rotatorów, które mają stosunkowo jasne kryteria diagnostyczne i patofizjologię, po problemy trudne do zdiagnozowania i zdefiniowania. Z klinicznego i epidemiologicznego punktu widzenia, te ostatnie przypadki stanowią wyzwanie podobne do tego, które stawiają dolegliwości bólowe dolnego odcinka kręgosłupa.

Dokładna diagnoza i leczenie zaburzeń barku są niezbędne dla udanego powrotu do pełnej funkcji. Właściwa diagnoza wymaga dokładnej znajomości anatomii i biomechaniki wszystkich struktur barku oraz patofizjologii urazów i schorzeń.

Celem rehabilitacji barku jest przywrócenie jego funkcji. Funkcja może być opisana na wiele sposobów, ale podstawą dla jej przywrócenia jest odtworzenie anatomii oraz normalizacja fizjologii i biomechaniki. Bez tych dwóch ostatnich elementów, bark nie będzie funkcjonował w prawidłowy sposób.

Analiza biomechaniczna ćwiczeń stosowanych podczas rehabilitacji pozwoliła na stworzenie programów rehabilitacyjnych opartych na dowodach naukowych. Wielu badaczy stara się zmierzyć parametry biomechaniczne i elektromiograficzne stosowanych ćwiczeń rehabilitacyjnych, starając się w pełni zrozumieć ich kliniczną zasadność i użyteczność. Ważne jest, aby brać pod uwagę implikacje anatomiczne, biomechaniczne i kliniczne podczas tworzenia programu ćwiczeń.

Słowa kluczowe: biomechanika barku, pierścień rotatorów

ULTRASONOGRAFIA. NA JAKIE PYTANIA FIZJOTERAPEUTY ODPOWIADA?**Iwona Kraśny¹, Magdalena Posadzy^{1,2}****¹Pracownia Narządu Ruchu Katedry Radiologii Ogólnej i Zabiegowej, Uniwersytet Medyczny im. Karola Marcinkowskiego w Poznaniu****²Rehasport Clinic, Poznań****iwonakrasny@gmail.com**

Badanie ultrasonograficzne (USG) stanowi ważne ogniwo w procesie diagnostycznym schorzeń barku. Dzięki swojej dużej czułości i specyficzności oraz coraz większej dostępności nieustannie wzrasta liczba wykonywanych badań z użyciem tej metody. Współczesna radiologia dysponuje szerokim wachlarzem metod obrazowych, do których należą również tomografia komputerowa, rezonans magnetyczny i radiologia konwencjonalna, stajemy zatem przed dylematem, które z badań wybrać, aby potwierdzić wstępne rozpoznanie kliniczne i uzyskać jak najwięcej potrzebnych informacji.

W traumatologii zaletą badania USG jest krótki czas jego wykonania z uwzględnieniem ograniczeń bólowych diagnozowanego pacjenta, jak również optymalnego dostosowania jego zakresu i przeprowadzenia ewentualnych prób czynnościowych. Ultrasonografia pozwala określić stopień uszkodzenia stożka rotatorów, patologie stawu barkowo-obojczykowego, pozastawowe uszkodzenia ścięgna głowy długiej mięśnia dwugłowego ramienia, obecność niemych lub niejasnych radiologicznie złamań guzka większego, obecność płynu w obrębie stawu. W przebiegu chorób na tle zwyrodnieniowym, ultrasonografia odgrywa rolę uzupełniającą szeroko stosowane w tych przypadkach obrazowanie w radiologii konwencjonalnej. U pacjentów ze schorzeniami na tle reumatologicznym, szereg wskazań stanowi diagnostyka zmian zapalnych w obrębie stawu ramiennego, barkowo-obojczykowego jak również kaletki podbarkowo-podnaramiennej.

Grupa specyficznych schorzeń obejmujących bark, takich jak wapniejące zapalenie ścięgien stożka rotatorów, krystalopatie (CPPD) i wiele innych jest diagnozowana za pomocą badania USG, gdy niejednokrotnie obraz rentgenowski pozostaje w granicach normy lub prezentuje bardzo subtelne i niejednoznaczne zmiany. Ogromną zaletą ultrasonografii jest badanie w czasie rzeczywistym z możliwością korelacji objawów klinicznych z obrazem tkanek oraz przeprowadzenia badań czynnościowych, np. w przebiegu części konfliktów podbarkowych. Ultrasonografia jest metodą wiarygodną, lecz nie pozbawioną ograniczeń, dlatego niezwykle ważne jest określenie algorytmu diagnostycznego uwzględniającego charakter urazu, wiek pacjenta i wiele innych istotnych, dodatkowych informacji klinicznych. **Słowa kluczowe:** diagnostyka obrazowa, ultrasonografia (USG), uszkodzenia ścięgien stożka rotatorów, bark pourazowy, choroby zwyrodnieniowe barku

CO POWINNIŚMY WIEDZIEĆ O BÓLU?**Przemysław Lisiński Katedra Reumatologii i Rehabilitacji, Uniwersytet Medyczny im. Karola Marcinkowskiego w Poznaniu****plisinski@vp.pl****Wstęp**

Ból jest niezwykle złożonym, trudnym do obiektywnej oceny objawem towarzyszącym wielu chorobom i urazom. W ogólnym ujęciu jest zjawiskiem nieprzyjemnym wymagającym leczenia. W praktyce fizjoterapeutycznej jest jednakże często użytecznym wskaźnikiem efektywności leczenia.

Cel

Celem przeprowadzonego badania była analiza występowania oraz mechanizmów modulacji bólu.

Metodyka

Przeanalizowano wszystkie publikacje z lat 2000–2015 w profilowanych czasopismach: Pain, European Neuropsychopharmacology, Psychiatry Research, The American Journal of Medicine stosując słowa kluczowe: ból, ośrodkowy układ nerwowy, fizjoterapia, placebo, nocebo.

Wyniki

Do ostatecznej analizy zakwalifikowano 46 prac oryginalnych łączących w sobie zagadnienia tłumaczące genezę, modulację i efekty kliniczne badań oceniających efekt placebo i nocebo. Fenomen placebo jest akceptowany i użyteczny w praktyce klinicznej z uwzględnieniem fizjoterapii i rehabilitacji.

Dyskusja

Efekt placebo występuje znacznie częściej niż nocebo i wpływa znacząco na efekty fizjoterapii w leczeniu bólu. Za występowanie obu efektów odpowiedzialne są różne struktury ośrodkowego układu nerwowego. Dopuszcza się wykorzystanie efektu placebo nie tylko w badaniach, ale także w praktyce klinicznej z zastrzeżeniem oparcia się o aspekty poznawcze tego fenomenu, jako czynnika wyzwalającego jego występowanie.

Słowa kluczowe: ból, ośrodkowy układ nerwowy, fizjoterapia, placebo, nocebo

ZESPOŁOWE PODEJŚCIE DO LECZENIE NIESTABILNOŚCI WIELOKIERUNKOWEJ

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Wielokierunkowa niestabilność stawu ramiennego jest złożoną i dość często spotykaną jednostką. Pacjenci dotknięci tym schorzeniem mają globalną (przednią, dolną i tylną), nadmierną wiotkość torebki stawowej otaczającej staw ramienny oraz uszkodzenie obrąbka torebki rotatora. Czynniki etiologiczne obejmują różne kombinacje powtarzających się urazów, wrodzonej wiotkości stawowej oraz jeden lub więcej poważnych urazów.

Początek symptomów ma najczęściej charakter nieurazowy. Problem ten jest spotykany zarówno u sportowców i osób aktywnych bez uogólnionej wiotkości stawowej, jak i u osób prowadzących siedzący tryb życia z wiotkością stawową. Głównym zgłaszanym problemem jest najczęściej ból niż niestabilność sama w sobie. Objawy są najczęściej odczuwane w środkowym zakresie ruchu stawu ramiennego.

Ponieważ przeciwny bark jest często równie wiotki i pozbawiony objawów, wydaje się, że oprócz nadmiernej wiotkości torebki stawowej, ważną rolę odgrywają także czynniki patofizjologiczne. Do tych czynników mogą należeć nieznaczna utrata siły i/lub koordynacji nerwowo-mięśniowej mięśni pierścienia rotatorów i stabilizatorów łopatki, zaburzenie odpowiedzi proprioptywnej oraz zwiększona objętość stawu. Większość pacjentów z powodzeniem może być leczona nieoperacyjnie zgodnie z odpowiednio przygotowanym zestawem ćwiczeń. Główne ich cele to poprawa koordynacji nerwowo-mięśniowej, stabilizacja (sylwetki, pozycji łopatki oraz pierścienia rotatorów) oraz stopniowe wzmacnianie. Zwykle program rehabilitacji przebiega w odpowiednich fazach. Musi być konsekwentny i długotrwały.

W przypadku, gdy 6 miesięczne leczenie nieoperacyjne zawodzi, pacjent może być kandydatem do leczenia operacyjnego. Zakwalifikowanie pacjenta z wielokierunkową niestabilnością do zabiegu jest niezwykle trudne, ponieważ wymaga nie tylko dbałości w określeniu wszystkich kierunków niestabilności i zaplanowania naprawy, ale także określenia poziomu motywacji pacjenta oraz wykluczeniu możliwości występowania innych czynników powodujących ból, poza wiotkością stawową. Podstawową techniką operacyjną jest plastyka torebki mająca na celu zmniejszenie objętości stawu. Tradycyjnie wykonywana była techniką otwartą, aktualnie wykonywana techniką artroskopową.

Słowa kluczowe: staw ramienny, niestabilność, leczenie

ZASADY LECZENIA ZŁAMAŃ BLIŻSZEGO KOŃCA KOŚCI RAMIENNEJ – OD UNIERUCHOMIENIA DO ENDOPROTEZOPLASTYKI

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Złamania w obrębie bliższego końca kości ramiennej są relatywnie częste. Podaje się, że stanowią około 5% wszystkich złamań. Najczęściej dochodzi do nich podczas upadku na wyprostowaną rękę lub podczas bezpośredniego uderzenia.

Prawie w 85% przypadków nie dochodzi podczas złamania do przemieszczenia, dzięki czemu można je leczyć zachowawczo. W przypadku niestabilnych złamań, leczeniem z wyboru jest stabilizacja podczas leczenia operacyjnego. W obu przypadkach główne cele rehabilitacji to utrzymanie i odzyskanie maksymalnie możliwego zakresu ruchu oraz funkcji nerwowo-mięśniowych całej kończyny górnej z zachowaniem stabilności złamania. Jak najszybsze uruchamianie uszkodzonego stawu, zmniejsza negatywne skutki unieruchomienia a także minimalizuje ryzyko pojawienia się „zamrożonego barku”. W pierwszym okresie rehabilitacja skupia się na zmniejszeniu dolegliwości bólowych, kontroli obrzęku, utrzymaniu zakresu ruchu w stawach nie objętych uszkodzeniem, a także w zależności od rodzaju złamania, uruchamianiu uszkodzonego stawu ramiennego w odpowiednich zakresach ruchu. Zazwyczaj po okresie od 2 do 3 tygodni wprowadza się bardziej agresywne techniki, przywracające zakres ruchu oraz ćwiczenia izometryczne mięśni stawu ramiennego w celu zminimalizowania atrofii mięśniowej. Dalsza rehabilitacja ma na celu przywrócenie pełnej sprawności pacjenta z przed urazu, poprzez kontynuowanie ćwiczeń poprawiających zakres ruchu, przywracających siłę i wytrzymałość mięśniową oraz kontrolę nerwowo-mięśniową całej kończyny górnej. U osób ze zwiększonym ryzykiem upadków, w czasie rehabilitacji wprowadza się także elementy treningu równowagi, aby zminimalizować ryzyko kolejnych złamań wynikających z upadków. Cały proces rehabilitacji przebiega przy ścisłej współpracy z lekarzem ortopedą, co pozwala na zmniejszenie ryzyka ewentualnych komplikacji.

W przypadku złamań przemieszczonych, wielofragmentowych lub z towarzyszącym zwłóknieniem, wskazane jest wykonanie diagnostyki obrazowej CT lub MRI przed wyborem ostatecznego sposobu leczenia. Leczenie operacyjne skomplikowanych złamań, pozwala odtworzyć prawidłową anatomię i zwiększyć prawdopodobieństwo przywrócenia funkcji kończyny. Złamania o podwyższonym ryzyku jałowej martwicy będącej następstwem uszkodzenia naczyń krwionośnych, szczególnie głowy kości ramiennej, są wskazaniem do zastosowania endoprotezy głowy kości ramiennej, urazowej anatomicznej lub odwróconej. Po zachowaniu okresu ciszy mechanicznej, koniecznej do uzyskania zrostu, pacjent

powinien zostać poddany usprawnianiu, które ma na celu przywrócenie ruchomości kończyny. Wielokrotnie nawet nieznacznie wadliwie wygojone złamania, skutkują dużym ograniczeniem zakresu ruchu jeśli nie są właściwie, intensywnie i cierpliwie usprawniane.
Słowa kluczowe: złamania kości ramiennej, leczenie operacyjne i zachowawcze

POSTĘPOWANIE Z PACJENTEM W OSTRYM USZKODZENIU STAWU RAMIENNEGO

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Staw ramienny ze względu na swoją złożoną budowę cechuje się największą ruchomością w układzie biomechanicznym człowieka. Fakt ten jednak może przyczyniać się do zwiększenia ryzyka występowania dysfunkcji i urazów, prowadzących w efekcie do znacznych ograniczeń funkcjonalnych kończyny górnej. Okolica barku to druga (po bólu kręgosłupa) najczęstsza lokalizacja bólu mięśniowo-szkieletowego. Postępowanie w stanie ostrym uzależnione jest od etiologii dolegliwości. W diagnostyce różnicowej uwzględnić należy patologię kompleksu barkowo-ramiennego oraz przyczyny pochodzące spoza barku. Postępowanie zachowawcze obejmuje edukację chorego, farmakoterapię oraz zabiegi fizjoterapeutyczne.

Z danych epidemiologicznych wynika, iż najczęstszymi dysfunkcjami stawu ramiennego, z jakimi pacjenci zgłaszają się do fizjoterapeuty są: zespół ciasnoty podbarkowej z towarzyszącym zapaleniem kaletki podbarkowej oraz uszkodzenie ścięgna stożka rotatorów. Podstawowe objawy to: stan zapalny z towarzyszącym bólem, bolesność palpacyjna, ograniczenie zakresów ruchu stawu, osłabienie siły mięśniowej, asymetria ułożeniowa w obręczy barkowej, zaburzona stabilizacja jak i propriocepcja stawu.

Z doświadczenia Kliniki Rehabilitacji Uniwersytetu Medycznego w Poznaniu wynika, iż w stanie ostrym barku słusznym jest stosowanie zabiegów przeciwzapalnych, przeciwbólowych i przyspieszających regenerację, tj. jonoforezy i fonoforezy z NLPZ, krioterapii, laseroterapii oraz magnetoterapii. W pierwszej fazie usprawniania odzyskiwanie zakresów ruchu oraz funkcji stawu odbywa się poprzez stopniowe ordynowanie indywidualnie dostosowanych do możliwości pacjenta ćwiczeń w zamkniętych łańcuchach kinematycznych, wzmacniających izometrycznych, jak również pierwszych ćwiczeń stabilizujących staw. Dużą efektywność przy odzyskiwaniu rytmu ramiennie-łopatkowego i normalizacji tonusu mięśniowego obręczy barkowej i kończyny górnej wykazują techniki terapii tkanek miękkich: mięśni piersiowych, równoległobocznych, obłych, mięśnia podłopatkowego, zębatego przedniego, dźwigacza łopatki, czworobocznego grzbietu oraz trójgłowego ramienia. Do terapii tych zaliczyć można poizometryczną relaksację, pozycyjne rozluźnianie, terapię punktów spustowych bólu, głęboki masaż poprzeczny, relaksację systemu powięziowego, wzorce łopatki według metody PNF. Skutecznym uzupełnieniem usprawniania barku w stanie ostrym są wybrane aplikacje metody *KinesioTaping*.

Słowa kluczowe: staw ramienny, usprawnianie

ZESPOŁOWE PODEJŚCIE DO LECZENIA BARKU ZAMROŻONEGO

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Zespół zamrożonego barku jest zagadnieniem stanowiącym wciąż niemałe wyzwanie dla lekarzy i fizjoterapeutów. Zespołowe podejście do tematu jest niezbędne do osiągnięcia sukcesu i pełnego wyleczenia pacjenta.

Zamrożony bark definiowany jest jako stan o niejasnej etiologii, charakteryzujący się znacznymi ograniczeniami zakresu ruchu aktywnego i biernego, co wywołuje poważną dysfunkcję stawu ramiennego. Stres jest najprawdopodobniej fundamentalną przyczyną pierwszych objawów „*frozen shoulder*”. Istnieją również korelacje z dysbalansem immunologicznym, biochemicznym i hormonalnym.

Charakterystyczny jest ekstremalny ból bez wymiernego uszkodzenia tkanki. W wywiadzie często nie odnotowuje się czynników sprawczych takich jak uraz czy przebyty zabieg chirurgiczny, mogących wpłynąć na powstanie dysfunkcji. Badania obrazowe oraz kliniczne wykluczają inne procesy patologiczne.

Pacjent trafiający do nas z dokuczliwym bólem i sporym ograniczeniem ruchu, często jest wystraszony i zdezorientowany. Rolą lekarza jest postawienie diagnozy, przedstawienie pacjentowi istoty dolegliwości oraz dostępnych sposobów leczenia. Edukacja pacjenta na temat zaburzenia jest fundamentem skutecznej terapii zachowawczej (fizjoterapii, dostawowych iniekcji sterydowych, doustnej terapii sterydowej) czy chirurgicznej (redresji w znieczuleniu, lub artroskopowej artrolizy stawu).

Zadaniem i jednocześnie wyzwaniem dla fizjoterapeuty jest walka z aktualnymi dolegliwościami, czyli bólem i sztywnością stawu. Wśród najskuteczniejszych metod wyróżniamy terapię manualną stawu, terapię powięziowo-mięśniową oraz odpowiednio dobrany zestaw ćwiczeń domowych.

Dopełnieniem terapii powinna być psychoterapia, nakierowana na przyczynę dolegliwości – stres. Można stwierdzić, że jest ona wciąż brakującym ogniwem w leczeniu. Nieodzownym wydaje się znalezienie odpowiednich dla pacjenta strategii radzenia sobie ze stresem i bólem. Przykład stanowią ćwiczenia oddechowe, treningi relaksacji, terapia TRE czy komora deprivacji sensorycznej.

Praca globalna z pacjentem, odnalezienie przyczyny problemu, włączenie psychoterapii, diety oraz innych metod alternatywnych, mogą okazać się niezbędne by osiągnąć cel, jakim jest pełne wyleczenie pacjenta.

Słowa kluczowe: zamrożony bark, ból barku

ZESPOŁOWE PODEJŚCIE DO LECZENIA ZESPOŁU CIASNOTY PODBARKOWEJ

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Zespół ciasnoty podbarkowej jest częstym schorzeniem o wieloczynnikowej etiologii, który wymaga odpowiedniej diagnostyki i wdrożenia właściwego leczenia. Odpowiednia współpraca lekarza ortopedy i fizjoterapeuty stanowi kluczowy warunek poprawy dolegliwości oraz szybkiego powrotu do pierwotnej sprawności.

Diagnostyka zespołu cieśni podbarkowej opiera się przede wszystkim na odpowiednio przeprowadzonym badaniu klinicznym (podmiotowym i przedmiotowym). Pacjent zwykle zgłasza ból, osłabienie siły, sztywność oraz trzeszczenia w okolicy barku. W badaniu przedmiotowym często występuje bolesność miejscowa, dodatnie testy ciasnoty podbarkowej (test Neer’a, Hawkins’a, bolesnego łuku), dodatni test z lignokainą oraz ograniczenie zakresu ruchu. Zespół ciasnoty podbarkowej należy różnicować z innymi schorzeniami barku takimi jak: uszkodzenie ścięgien pierścienia rotatorów, zespół zamrożonego barku, radikulopatia szyjna, patologie splotu ramiennego. W postawieniu właściwego rozpoznania pomocne są metody diagnostyki obrazowej (Rtg, RM, TK).

Leczenie zachowawcze można rozpocząć od podania iniekcji sterydowej do przestrzeni podbarkowej, która może zmniejszyć dolegliwości bólowe oraz ułatwić dalszą rehabilitację. W procesie usprawniania należy skupić się na obniżeniu głowy kości ramiennej i poprawie stabilizacji głębokiej mięśni tułowia i barków. W tym celu dobrze jest wprowadzić ćwiczenia mięśni rotatorów, ćwiczenia przedniej części mięśnia naramiennego i mięśni posturalnych.

W przypadku niepowodzenia leczenia zachowawczego (brak poprawy po 3–6 miesięcznym programie leczenia) można rozważyć leczenie operacyjne – artroskopię barku, polegającą na odbarczeniu przestrzeni podbarkowej (bursektomii, akromioplastyce, przecięciu więzadła CA).

Po zabiegu operacyjnym usprawnianie należy rozpocząć już w pierwszej dobie, opierając je na ćwiczeniach wspomaganych i czynnych, których głównym celem jest mobilizacja tkanek i zwiększenie zakresu ruchu. W przypadkach silnych dolegliwości bólowych i trudności z uzyskaniem czynnego zakresu ruchu wskazane jest wykorzystanie urządzeń ciągłego ruchu biernego.

Słowa kluczowe: zespół ciasnoty podbarkowej, diagnostyka, leczenie

ENDOPROTEZOPLASTYKA ANATOMICZNA I ODWRÓCONA STAWU RAMIENNEGO – RÓŻNICE W KONSTRUKCJI I USPRAWNIANIU

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Wskazania do wykonania endoprotezoplastyki stawu ramiennego determinują wybór typu endoprotezy i późniejszy sposób postępowania usprawniającego. W przypadku urazu (najczęściej złamania), po operacji endoprotezoplastyki można oczekiwać odzyskania prawie pełnej funkcji stawu (nawet powrotu do sportu). W przypadku chorych ze zmianami zwyrodnieniowymi, endoprotezoplastyka ma na celu zlikwidowanie dolegliwości bólowych, a rehabilitacja powinna pozwolić na powrót do samoobsługi i wykonywania czynności dnia codziennego.

Przed wyborem odpowiedniego typu endoprotezy, niezbędna jest dokładna ocena kliniczna i funkcjonalna, której najważniejsze elementy to ocena siły mięśni oraz stabilności stawu. Odruchowe, przeciwbólowe unieruchomienie stawu ramiennego przez pacjenta, prowadzi często do górnej migracji głowy kości ramiennej oraz osłabienia mięśni ją obniżających, dlatego ważna jest ocena radiologiczna pod kątem ustawienia głowy kości ramiennej względem panewki stawu oraz wysokości przestrzeni podbarkowej. Wybór rodzaju endoprotezy determinuje obecność ścięgien mięśni pierścienia rotatorów.

Endoprotezoplastyka anatomiczna wskazana jest w przypadku zachowanej funkcji i siły mięśni pierścienia rotatorów oraz stabilności stawu. Najczęstszym problemem po tym typie operacji jest odruchowa migracja górna głowy kości ramiennej, wynikająca z nierównowagi sił mięśni rotatorów i naramiennego, która może doprowadzić do przerwania ścięgien mięśni rotatorów. Aby utrzymać centralizację głowy kości ramiennej, należy aktywować mięśnie, które ją obniżają i centrują oraz nauczyć czynnie kontrolować tor ruchu łopatki. Częstym problemem może być też niewydolność mięśnia podłopatkowego, która może spowodować przesuwanie się głowy kości ramiennej do przodu, dlatego ważne jest zwrócenie uwagi na pracę tego mięśnia.

Endoprotezoplastyka odwrócona jest wskazana przy braku funkcji mięśni pierścienia rotatorów (szczególnie mięśnia nadgrzebieniowego). Należy przy tym pamiętać, że proces

usprawniania powinien skupić się na ćwiczeniu każdego aktonu mięśnia naramiennego, który w tym przypadku jest głównym motorem stawu ramiennego. Dla zachowania stabilności ważna jest funkcja mięśnia podłopatkowego.

Słowa kluczowe: endoprotezoplastyka anatomiczna, endoprotezoplastyka odwrócona, staw ramienny, usprawnianie

ROLA STABILIZACJI GŁĘBOKIEJ W REHABILITACJI BARKU

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W ostatnich latach w związku z rozwojem technologii i metod leczenia pacjentów z różnego rodzaju schorzeniami ortopedycznymi, coraz więcej uwagi poświęca się podejściu holistycznemu. Dolegliwości bólowe odczuwane przez chorego nieodzwrotnie wpływają na jego postawę, znacznie ją pogarszając, wskutek czego destabilizacji ulega równowaga mięśni posturalnych i mięśni kończyn. Centralna stabilizacja głęboka (ang. *core stability*) jest bazą wyjściową dla uzyskania pełnej mobilności na obwodzie ciała i podstawowym warunkiem uzyskania koordynacji ruchów kończyn. Jej odpowiednio dobrane elementy i ćwiczenia, powinny znaleźć się w protokole usprawniania bez względu na rodzaj wybranego leczenia zachowawczego czy operacyjnego. Problematyka usprawniania barku związana jest często z trudnościami z uzyskaniem końcowego, pełnego zakresu ruchu i powrotem do pełni sprawności. Stabilizacja głęboka pozwala na aktywację głębokich struktur wpływając nie tylko na zakres ruchu kończyny, ale również na poprawę propriocepcji. Czucie głębokie, którego drogi aferentne przewodzą bodźce nerwowe odbierane przez wyspecjalizowane receptory zlokalizowane w skórze, strukturach stawowych i mięśniach, bezpośrednio do ośrodkowego układu nerwowego. Pozwala to na kontrolę równowagi, prawidłowego ruchu i pozycji stawów. Wszelkie zaburzenia w przewodzeniu informacji z proprioceptorów spowodowane urazami, zabiegami operacyjnymi, ale również nieprawidłową postawą ciała, powodują pogorszenie propriocepcji i upośledzają proces powrotu pacjenta do pełni sprawności.

Słowa kluczowe: staw ramienny, głęboka stabilizacja

ZESPOŁOWE PODEJŚCIE DO LECZENIA NIESTABILNOŚCI URAZOWEJ STAWU RAMIENNEGO

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Staw ramienny charakteryzuje się największą ruchomością spośród wszystkich stawów. Jego specyficzna budowa powoduje, że jest najbardziej podatnym stawem na zwichnięcie. Narażeni są przede wszystkim młodzi pacjenci, w szczególności uprawiający sporty kontaktowe. Najczęściej rozpoznawane są zwichnięcia przednie stawu ramiennego, gdzie głowa kości ramiennej przemieszcza się do przodu od panewki łopatki. Następstwem może być niestabilność stawu ramiennego. Rozpoznanie opiera się na dokładnie zebranych wywiadzie oraz badaniu klinicznym. Badania dodatkowe, takie jak rezonans magnetyczny oraz tomografia komputerowa pomagają m.in. ocenić rozległość uszkodzenia obrąbka oraz obecność ubytku kostnego panewki, czy ubytku w głowie kości ramiennej (ang. *Hill Sach's Lesion*).

Aktualnie stosowanym leczeniem operacyjnym jest artroskopowa stabilizacja obrąbka przy użyciu kotwic. Jeżeli ubytek panewki łopatki przekracza 20%, wskazana jest operacja według Latarjet, w której przenosi się wyrostek kruczy lub przeszczep z talerza biodrowego na panewkę łopatki, celem uzupełnienia ubytku w powierzchni stawowej.

W przypadku pacjentów po 25 roku życia oraz nieuprawiających sportów kontaktowych wysokiego ryzyka, zalecane jest wdrożenie procesu rehabilitacji po możliwym uprzednim unieruchomieniu stawu ramiennego w pozycji przywiedzenia i rotacji zewnętrznej przez okres maksymalnie trzech tygodni. U pacjentów w młodym wieku lub uczestniczących w aktywnościach sportowych wysokiego ryzyka, nadzorowana rehabilitacja rozpoczyna się po około czterech do sześciu tygodniach od przeprowadzonego zabiegu operacyjnego w zależności od rozległości uszkodzenia. Proces usprawniania obejmuje m.in. ćwiczenia zwiększające zakres ruchu, aktywujące mięśnie stabilizujące kompleks ramiennie-łopatkowy, poprawiające czucie głębokie oraz zwiększające siłę mięśniową zarówno w obrębie stawu ramiennego, jak i tułowia oraz kompleksu biodrowo-miedniczno-lędźwiowego.

Słowa kluczowe: niestabilność barku, zwicnięcie barku, obrąbek, panewka łopatki

PROXIMAL HUMERAL FRACTURES – FIXATION

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SUMMARY

Proximal humeral fracture is the third common type of fracture behind distal radius and proximal femur. In most cases it affects older patients (over the age of fifty) with the incidence increasing over the following three decades. Women are affected twice as much as men and this is related to osteoporosis. The aim of fixation is to restore the function as much as possible and to minimize a pain. The problem is that fixation management has not been standardized, yet. There are different kinds of fracture classifications, different surgical approaches and different kinds of fracture fixation. Before we make the final decision as to what kind of fixation we will use, we should try to understand the fracture, because “the first shot is the best shot”. This means that the treatment of proximal humeral fracture sequela is very difficult and the outcomes are poor.

Keywords: proximal humeral fractures, fixation

Introduction

Proximal humeral fracture is the third common type of fracture behind distal radius and proximal femur. In most cases it affects older patients (over the age of fifty), with the incidence increasing over the following three decades (Kannus *et al.* 2000). Women are affected twice as often as men and this is related to osteoporosis (Oval and Tuckermann 2006).

The aim of fixation is to restore the function as much as possible and to minimize a pain. The problem is that fixation management has not been standardized, yet. There are different kinds of fractures classifications, different surgical approaches and different kinds of fracture fixation and we still do not know, which option is the best for a particular patient. Another problem is that most of those fractures are treated in small the centers, where the surgeon performs fewer than 10–15 proximal humeral operations per year.

Materials and methods

Decision making process

Before we make the final decision as to what kind of fixation we will use, we should try to understand the fracture depending on the patient’s age and requirements, fracture patterns such as: integrity of calcar and medial hinge, degree of tuberosity displacement, head impaction (valgus/varus), displacement of humeral shaft, head splitting or gleno-humeral dislocation, bone quality (Castoldi *et al.* 2015). A careful analysis of the fracture is extremely important because ...“The first shot is the best shot”... This means that the treatment of proximal humeral fracture sequela is very difficult and the outcomes are poor.

Operating theatre

The patient’s position is very important. The upper arm should be kept free to allow a good surgical access and to allow a good X-ray visualization during surgery. We have two options, beach chair position and supine position (Figure 1). The advantages of the beach chair position are a greater range of movement in the operated upper limb, compatibility with every type of procedure; it is easy to change the type of operation during surgery. The disadvantage is difficult to obtain a full axial projection with the C-arm. The advantage of the supine position is a good axial view without moving the arm, which is very

useful for unstable fractures. The disadvantages are a smaller range of movement, difficulties to change the type of procedure during surgery. A few tests should be performed before surgery, to ensure that we can obtain all the X-ray views (Castoldi *et al.* 2015).



Figure 1. The patient's position in operating theatre.

Surgical approaches

The literatures describes several surgical approaches. In most cases we use the deltopectoral or lateral approaches. The advantages of the delto-pectoral approach are the access between the muscles – we do not detach the muscles from the bone, it is easy to extend distally along the arm down. The disadvantages are difficulties in access to the posterior part of the proximal humerus; in the case of intra-articular inspection we must detach the subscapularis tendon, which results in the risk of re-rupture, fat degeneration or loss of subscapularis muscle strength (Scheibel and Habermeyer 2008); several neurovascular structures can be in danger, the brachial plexus, the axillary nerve, the musculocutaneous nerve and the anterior circumflex artery. The advantage of the lateral/trans-deltoid approach is a good access to the greater tuberosity. The disadvantages are a limited access to the proximal humerus, the axillary nerve may be in danger, there is a risk of weakness in the deltoid muscle.

Fixation techniques

Percutaneous fixation with close or mini-invasive open reduction

The advantages of percutaneous fixation (Figure 2) are that the lower disruption of soft tissue and periosteum reduces the risk of AVN, there is a lower risk of fibrosis and stiffness, because the rotator cuff and articular surface are preserved, a better cosmetic effect is achieved, the cost is lower. The disadvantages are that there is a risk of pin migration, reduction loss and pin-site infection; there is a long learning curve; there are difficulties in achieving anatomic reduction (often it is not possible); neurovascular structures are in danger, especially the axillary nerve and circumflex arteries.

The ways to improve the stability after pin fixation are the box configuration of pins, application of fully threaded pins with a wider diameter, an augmentation with external fixation (Castoldi *et al.* 2010). The best indications for percutaneous fixation are a good



Figure 2. X-ray presenting a percutaneous fixation.

bone stock, a minimal comminution, an intact medial calcar, a good patient's compliance, the two-fragment fractures (Magovern and Ramsay 2008). However, some authors prefer this technique even for three- and four-part fractures (Resch *et al.* 1997).

The contraindications are the lack of solid lateral cortex where the pins will be introduced, the highly comminuted tuberosities resulting in problems maintaining anatomic integrity (Castoldi *et al.* 2015). The relative contraindications are splitting of the humeral head leading to a risk of AVN, but Resch *et al.* 2001) state that young patients with head splitting can be treated successfully with pin-fixation; the fractures with diaphysis involvement (Castoldi *et al.* 2015). The Stress technical points in surgical technique are that the starting point of the pins should be a minimum of 2 cm from the fracture, the pins should be spread widely apart, the pins should reach the subchondral bone but not go through it (Herscovici *et al.* 2000). Postoperative management includes a simple sling in adduction for 3–4 weeks, the passive exercises immediately after surgery (but some authors suggest postponing them for 3–4 weeks), the pins should be removed 3–6 weeks after the operation Castoldi *et al.* 2015).

Open reduction and internal fixation with LCP

The advantages of LCP stabilization (Figure 3) are that many cadaver studies show better stability and stress resistance after using LCP, due to the locking screws and polyaxial directions of the screws; a better alignment of the fracture fragments; a precontoured plate can be a template for fracture reduction; the holes for bone sutures – we can fix the small fracture fragments and neutralize the tensile strength in rotator cuff tendons (Edwards *et al.* 2006; Seide *et al.* 2007; Castoldi *et al.* 2015). The disadvantages are a wide approach, leading to a risk of soft tissue damage during the fracture reduction; an increased risk of AVN; a risk that the screws will perforate the humeral head; some authors emphasize that LCP can be too rigid, especially when we have the comminuted fractures and osteoporotic bone. The indications for LCP fixation are that in all proximal humeral fractures in which the dislocation of the fragments is so big it should not be left for conservative treatment considering the age and functional expectations of the patient.

The contraindications for LCP stabilization are the head splitting fractures, the true anatomic neck fractures, the most fracture dislocation, the 4-part geriatric fractures, a severe osteoporosis, the late presentation, more than 4 weeks after injury. The stress technical points are (Castoldi *et al.* 2015; Namdari *et al.* 2012) that LHB is a key landmark for anatomy; the restoring the continuity of the bicipital groove is very helpful for assessing the fracture reduction before radioscopy checking; the gentle reduction of the

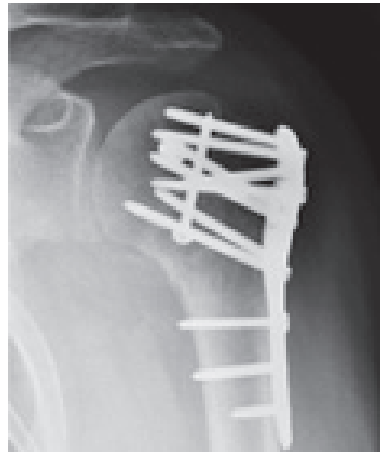


Figure 3. X-ray presenting an open reduction and internal fixation with LCP.

fracture fragments in respect of soft tissue and temporary K-wire fixation before final stabilization; the incision though the rotator cuff between the fragments of greater tuberosity or through the rotator interval to expose the humeral head; the augmentation of bone loss in the humeral head after valgus fracture reduction should be considered in the patient with osteoporosis; a precise reduction of both tuberosities is necessary to achieve a good rotator cuff balance; the correct plate position – if too high we will have an impingement, but if too low we will not have adequate support for the tuberosities. The postoperative management includes a simple sling in adduction for 3–4 weeks, the passive exercises immediately after surgery, the plate removal is not necessary (Castoldi *et al.* 2015).

Achieving a good balance between the quality of the fracture reduction and the soft tissue damage is the key point of the operation. A stable fixation with a complete passive range of movement is our aim and we should not look for absolutely perfect radiographic alignment (Castoldi *et al.* 2015).

Intramedullary nail for proximal humerus fractures

The advantages of the intramedullary nail (Figure 4) are that it is a less invasive procedure, there is less soft tissue dissection, the construction is stable, but gives some elasticity (which is helpful in comminuted fractures and osteopenic bone), for simple fractures, surgery time is shorter. The disadvantages are that there is quite a long learning curve, there is a risk of inadequate fracture reduction, there is a risk of greater tuberosity fracture, there is a risk of acromial impingement, there is a risk of proximal fixation failure, there is a risk of screw penetration. Most of these problems are caused by nails which are too long, too large, bent, not centered and with poorly-oriented and poorly-fixed proximal screws (Castoldi *et al.* 2015). Newly-designed nails help us to avoid these risks.

The indications for intramedullary fixations are the two-part fractures, three part (greater tuberosity) fractures, four-part valgus impacted fractures. The contraindications for intramedullary stabilization are four-part varus fractures, head-splitting fractures, true anatomic neck fractures, most fracture dislocation, 4-part geriatric fractures, severe osteoporosis, late presentation – more than 4 weeks after injury. The stress technical points (Castoldi *et al.* 2015) are that each type of fracture (2-, 3-, 4-parts) has its own pathophysiology and potential complications – so the op-technique must be adopted to the particular fracture, the entry point for newly-designed straight nails goes through the humeral head and muscular part of the supraspinatus, 3 approaches are possible: percutaneous, transdeltoid or deltopectoral, if the bicipital groove is fractured – the LHB



Figure 4. X-ray presenting the intramedullary nail for proximal humerus fracture (with a permission from Bartosz Kordasiewicz).

must be tenodesed. Postoperative management includes a simple sling in adduction for 3–4 weeks, the passive exercises immediately after surgery, a nail removal is not necessary.

Conclusions

We do not have any classification, which allows us to associate a type of fracture to a single type of treatment (Castoldi *et al.* 2015). The major role in the vascular supply of the humeral head is played by the posterior circumflex artery, not the anterior (Hertel *et al.* 2004; Hetterich *et al.* 2010). Before we make the final decision as to what kind of fixation we will use, we should try to understand the fracture, because “the first shot is the best shot”. The most important question is not how I should FIX the fracture but how I should REDUCE it? Proximal humeral fracture fixation should not be an emergency procedure. We should take the time to take precise radiographic pictures, to plan the treatment, to prepare an experienced op-team and to choose the best surgical instrumentation (pins, dedicated plates, bone graft, shoulder prosthesis (Castoldi *et al.* 2015). The results after proximal humeral fractures fixation are the best after 2-part fractures (about 90% of good results), worse after 3-part fractures (about 80% of good results) and the worst after 4-part fractures (only about 60% of good results), but we should remember that there are a lot of factors, which have an influence on our results like the type of fracture, the patient’s age and requirements, the bone quality, the available equipments for fixation, the surgeons skills and experience. It is very difficult to compare a different kind of treatment and a different kind of fixations.

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SHORT COMMUNICATION

CURRENT ASPECTS IN ANATOMICAL ARTHROPLASTY

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Primary goals of anatomic shoulder arthroplasty are pain reduction, improvement of shoulder function, preservation of strength, low technique morbidity and a long implant survival rate (Loew *et al.* 2007). However, negative prognostic outcome factors are an external rotation of less than 0°, dorsal subluxation and fatty infiltration of the infraspinatus muscle. Therefore, the right moment of arthroplasty is crucial. Today, a variety of implants for anatomical arthroplasty is available on the market. Besides established and well-studied stem prostheses, surface replacement and stemless implants are used. Shoulder arthroplasty has made great progress from Neer's initial first generation cemented humeral monoblock with a smooth surface and only mid-range sizes without the opportunity to reproduce the proximal humeral anatomy. Further investigation into anatomical variants led to the development of later generation components. Humeral components of the 4th generation provide a continuous modularity around three axes. Depending on the design they allow anatomic placement of the prosthetic humeral head in anteroposterior and mediolateral direction in reference to the stem as well as various degrees of head inclination. Today, problems of the humeral component are rare. Soft tissue insufficiency and glenoid component complications are more relevant in terms of revision and long-term survival rates.

Cementless surface replacement arthroplasty (CSRA) has been first introduced 1981 in Sweden as a treatment for the rheumatoid shoulder. Its indication has been expanded to degenerative arthritis by Copeland and today it is advocated for young and active patients with a good bone quality, a humeral defect of up to 30% of the humeral head and in cases of uncomplicated arthritis and low-grade humeral head necrosis. CSRA provides the possibility of anatomical head reconstruction, easy revision due to preservation of proximal bone stock, short operation times and an adjustment of version, offset and angulation (Levy *et al.* 2004). However, in osteoporotic bone CSRA provides little bony support and an increased humeral subsidence has been seen after changes in inclination. In-vitro signs of stress shielding and central bone stock resorption have been voiced as a possible reason for reduced long-term stability, especially in compromised bone quality (Schmidutz *et al.* 2014). Besides, early circular implants did not reflect true humeral anatomy as the antero-posterior humeral diameter is smaller than the medio-lateral making the head elliptic rather than rotund. Furthermore, oversizing with subsequent glenoid erosion remains a problem (Al-Hadithy *et al.* 2012). Modern cup implants try to overcome disadvantages due to lesser head height, different sizes and a hydroxyapatite-coated epiphyseal anchorage. So far, the outstanding results of the designer's institution have not been repeated (Copeland and Levy 2011).

Stemless prostheses provide a larger range of possible indications. They are independent of head-shaft-geometry, bone-preserving and are able to recreate the anatomical gleno-humeral rotation center. Due to humeral head resection, total arthroplasty and glenoid preparation is easier compared to CSRA. Indications for stemless implants range from primary arthritis, idiopathic or posttraumatic necrosis, instability arthropathy to fracture sequelae. A variety of humeral implants with different humeral fixation systems ranging from hollow screws to impacted corollas is available. In total arthroplasty, different options for glenoid replacement such as cemented polyethylene, cementless metal-back

or hybrid glenoid systems can be chosen from. Metal-back glenoids have been associated with an early and distinct polyethylene wear due to high contact stress (Hopkins *et al.* 2007; Oosterom *et al.* 2003). Eccentric glenoid strain may even lead to dislocation of the inlay and/or loosening and fracture of the screws (Matsen *et al.* 2008). Revision rates of polyethylene glenoids (1.7%) have been proposed to be less than those of metal-back glenoids (6.8%) (Radnay *et al.* 2007). So far, short- and mid-term results are at least comparable to stem prostheses (Petriccioli *et al.* 2015).

Due to currently lacking long-term results of stemless implants, shoulder arthroplasty using a humeral stem prosthesis remains the “gold standard”. So far, stemless arthroplasty yields promising short- and midterm results. Glenoid component problems remain to be challenging. Principles of shoulder arthroplasty such as soft-tissue balancing and recreation of humeral head geometry should be respected, regardless of the chosen implant.

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SHORT COMMUNICATION

SCAPULAR FRACTURES

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Scapular fractures account for 3–5% of all injuries to the shoulder girdle and 0.5–1% of all fractures (Rowe 1963; McGinnis and Denton 1989). They are often indicative of a severe thoracic trauma in a polytraumatized patient (Armstrong and Van der Spuy 1984; Thompson *et al.* 1985). Typically, heavy blunt direct force to the shoulder girdle is necessary to fracture the scapula, the scapular spine and or the acromion due to the “recoil mechanism” on the thorax (Rowe 1963). Indirect levering or pulling forces may, in accordance to their severity, lead to glenoid rim or neck fracture as well as scapula-thoracic dissociation, that may impair neurovascular structures and potentially results in a lethal outcome (Ebraheim *et al.* 1985). Scapular fractures occur in high-velocity trauma such as traffic accidents, fall from great height or certain sports (horseback riding, skiing, snowboarding).

In the past, numerous classifications for scapular fractures have been proposed, of which so far none has been thoroughly accepted. Euler and Ruedi tried to consider morphology, severity and prognosis of the fracture in order to aid in treatment decisions (Euler and Ruedi 1996). They distinguish between shoulder blade fractures (type A), appendix fractures such as spine, coracoid or acromion (type B), extraarticular collum fractures (type C), glenoid fractures (type D) with or without further scapular involvement and combination fractures with fractures of the humeral head (type E).

Radiographic evaluation should include a trauma series (true a.p., y-view/transcapular view, axillary – if possible). Most fractures cannot be adequately displayed with native radiography only. Therefore, computed tomography with 3D-reconstruction should be obtained to assess all fracture details and to facilitate a possible surgical procedure.

The majority of scapular fractures such as fractures of the shoulder blade, undisplaced appendicular and collum fractures can be treated non-surgical. Large solitary glenoid fractures with a centered humeral head can heal with good results after conservative treatment as well (Kraus *et al.* 2010). Initial immobilization and cryotherapy is followed by symptom-adapted pendulum exercises as well as passive and later active-assisted range-of motion practices. Active weight-bearing exercises should be postponed until the beginning of bony consolidation after 4–6 weeks.

Displaced appendicular and collum fractures, floating shoulder injuries as well as most intraarticular injuries should be treated surgically due to compromised results after conservative treatment. Besides open screw and plate osteosynthesis, some intraarticular scapular fractures are suited for arthroscopic refixation (Laitai *et al.* 2003). The possible advantages of arthroscopic screw fixation such as lower morbidity, faster recovery and direct inspection of intraarticular reduction include the diagnosis and treatment of accompanying gleno-humeral soft-tissue injuries. Comminuted intraarticular fractures with multiple glenoid fragments present a limit of arthroscopic reconstruction. Results of surgical treatment of scapular fractures are rare as the majority of injuries are treated conservatively with adequate results (Zlowodski *et al.* 2006). However, a difference in range-of-motion and strength may persist after non-surgical treatment (Schofer *et al.* 2009). Therefore, some authors propose a more generous indication for surgery (Lantry *et al.* 2008). Arthroscopic treatment of glenoid fractures leads to good and excellent results (Scheibel *et al.* 2015).

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RESEARCH REPORT

CONSERVATIVE TREATMENT OF THE THROWING SHOULDER

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Introduction and aim

Most overuse shoulder injuries in throwing sports are conservatively managed (Brukner and Khan 2012). Even in some cases of injuries where structural integrity of the shoulder complex is compromised through overuse mechanism, conservative treatment has a role to play. A study by Edwards *et al.* (2010) supports conservative treatment as the first option in isolated superior labral anterior to posterior (SLAP) lesions in patients of various sporting ability, showing equal subjective and functional outcomes following conservative versus surgical treatment. Example of conservative treatment of an overhead athlete is highlighted in the presented case study.

Patient, methods, results

Example of conservative treatment of an overhead athlete is highlighted in the following case study: A 21 year old professional tennis player developed a gradual onset of intermittent right shoulder pain one day after a match which involved heavy tennis balls and inconsistent second serve performance. The pain was sharp/ache, deep, movement dependent but of low irritability. There was reported feeling of dead/weak arm in some instances as well as non-painful clicking. Aggravating factors included serving (impact more than deceleration), right side lying and removing the shirt off or bra off. Also in the gym it felt weak, painful to do press ups, cuff exercises and overhead lifting. Clinically the most significant findings were resting right scapula position in downward rotation, anterior tilt and humeral head anteriorly positioned. The downward rotation was more pronounced during active shoulder abduction. She demonstrated decreased active abduction by 10 degrees which was restored with scapular repositioning maneuver, as was decreased flexion and external rotation. Isometric external rotation strength in 0 degrees abduction was 4/5 on Oxford scale at 0 degrees of abduction, and 4+/5 at 90 degrees of abduction, which both significantly improved with scapula repositioning but were still painful. Empty can was 3+/5 and limited by pain, full can was 5/5 and pain free, lift off test was 5-/5 with minimal pain, while other isometric tests were normal. Dynamic rotary stability test showed humeral head forward translation at 45 degrees of abduction. There was tenderness on palpation over biceps long head tendon and superolateral arm. MRI results showed 1 cm by 5 mm partial-thickness supraspinatus tear next to glenoid attachment, background supraspinatus tendinopathy and mild subacromial bursitis. The dynamic ultrasound identified the tear to be intra-substance tear which resembled tendinopathy. Conservative treatment was indicated by the specialist five days following a corticosteroid injection into the subacromial space to help decrease pain.

Rehabilitation goals were to decrease pain with relative rest and unloading from painful activities, restore normal scapulo-humeral rhythm, increase rotator cuff strength and restore global shoulder strength back to pre-injury level, restore normal mechanics and frequency of serving.

Following initial rest of 5 days (as per specialist's orders) the player started began with scapula setting exercises to improve scapular upward rotation and posterior tilt. Exercises were performed in different positions using only the weight of the arm, they required

scapular pre-setting before every repetition to optimize recruitment of periscapular and rotator cuff muscles (Mottram *et al.* 2009) as well as to promote neuromuscular retraining, and the dosage was set at 3 sets to fatigue with the goal being 3 sets of 20 before resistance was introduced or progressed. Also soft tissue work was performed around anterior shoulder, posterior cuff and periscapular muscles to ensure optimal length-tension relationship in shoulder muscles. Outcome measures were full active range of abduction and ER with good scapula upward rotation and posterior tilt, restoration of screening scores of passive IR and ER, with passive shoulder rotation being no more than 20 degrees less compared to left side (Shanley *et al.* 2011). Although total passive range of shoulder motion has been established in literature as an important objective measure in rehabilitation (Wilk *et al.* 2002), studies on tennis players differ and therefore do not support the need for equal total range of motion on both sides (Ellenbecker *et al.* 2002).

Rotator cuff strengthening was re-introduced as soon as the patient was able to rotate her arm pain free against gravity in side lying. Initially all rotator cuff-specific exercises were performed in 0 degrees of abduction and when resistance against sufficient weight was achieved with good scapula setting, the arm was elevated by 30 degrees at a time. When normal scapula-humeral rhythm was established for abduction and external rotation, the player was allowed to resume weight training in the gym, starting with exercises below shoulder level. Simultaneously the player was cleared to start hitting groundstrokes but no serving. When the player progressed to rotator cuff exercises at 90 degrees of abduction with some resistance, she was cleared to resume press ups and overhead shoulder exercises. Isotonic cuff exercises were progressed to eccentric, and some plyometric exercises were added before considering returning to serving. Outcome measures for rotator cuff were ER:IR ratio to be greater than 0.8 to minimise injury risk (Byram *et al.* 2010) and mini-plyometric cuff exercise to be performed for 3 sets of 60 seconds.

Once the player was cleared to serve gradual buildup of serving pace and number of serves was performed. Once 30 serves were performed normally and pain free, the player's first and second serves were analyzed by a biomechanics. A technical fault was noted on second serve as a risk factor for re injury, and the player continued to work on her second serve to correct the fault while continuing to build up serving volume and rehabilitation exercises. Biomechanical inefficiencies are important to identify and mitigate when it comes to serving, as incorrect use of the kinetic chain may lead to a recurrent or new injury (Van Der Hoeven and Kibler 2006).

Conclusion

After 12 weeks of rehabilitation and gradual re-introduction to serving, the player resumed competition at 13 weeks with no subsequent recurrence of injury.

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SHORT COMMUNICATION

TIPS AND TRICKS IN SHOULDER ARTHROSCOPY (FROM PREPARATION TO PROCEDURE)

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SUMMARY

Shoulder joint is very complex structure of soft and hard tissues. Good visualization of the shoulder joint requires not only specialized equipment and the experienced surgical team with significant skills and in-depth knowledge of shoulder anatomy but also an experienced anesthetist's team. There are multiple approaches to the shoulder that should be chosen according to the individual procedure and the surgeon's discretion. A good positioning of the patient and preoperative plan are essential. Despite the high complexity of shoulder arthroscopy there are few tips and tricks that may optimize the procedure and minimize complication rate.

Keywords: shoulder arthroscopy, basic principles, tips and trips

The shoulder arthroscopy is very demanding, difficult and expensive procedure. Long learning curve and late outcomes discourage many good but impatient surgeons from these time-consuming procedures. A responsibility for patient appears in the beginning of common adventure. It depends on a few conditions, which we should fulfil whole knowledge, sufficient technical skills, a 30 and optionally 70 degrees arthroscope and arthroscopy equipment with obligatory electrocautery ablation system, a comfortable operative table allowing to reach a proper patient position, a portfolio of many handy shoulder instruments enabling injured structures repair, a portfolio of basic implants with strong sutures and tapes, the possibility of choosing a relevant splint, the intuitive cooperation of the whole surgical team (assistants, nurses) understanding without words our routine activities, an experienced anesthetist team leading a safe anesthesia from a premedication to back to a hospital room, a proper rehabilitation protocol including an individual attitude for the problematic patients (responsible physiotherapy).

A visualization is a general principle of a good surgery. Bleeding (even small) during any surgery can inhibit visualization. To minimize the potential bleeding in a shoulder, the first principle is to build a relationship with understanding and accommodating anesthesiologists. We prefer that the patient's systolic blood pressure should be kept below 100mm Hg. An arthroscopy pump infuses normal saline at 60 mm Hg. The type of anesthesia has the decisive role in a safe and clear shoulder arthroscopy. We prefer a combined anesthesia: general and regional – cervical plexus blockade obtaining controlled bradycardia and hypotension due to the lack of sympathetic system agitation and excretion of catecholamine and a complete pain blockade.

The second principle is to avoid creating bleeding vessels working in areas, which are potential sources of bleeding (there are coracoid region, medial subacromial bursa, anterior coracoacromial ligament region). The electrocautery ablation device is really helpful.

The third condition to avoid bleeding is a turbulence control connected with the Bernoulli effect. Some surgeons add adrenaline to saline used during arthroscopy to reduce bleeding.

There are two common type of positioning: lateral decubitus and beach chair. The choice always belongs to the surgeon, who decides which one is he familiar with. Both of them have advantages and disadvantages. The truth is, we can decrease the blood pressure safer in the lateral decubitus position. We should be careful because the long

lasting traction of upper extremity and bad positioning of the head and neck can predispose towards neurological injuries. The beach chair position, which demands a very good stabilization of the torso, head and neck is more familiar for surgeons because of preserving anatomical relations and an easy exposure in the case of the change of the arthroscopic to open procedure. We should be careful because of decreasing patient's blood pressure – risk of brain stroke.

An accurate portal placement is one of the most important steps to master during a shoulder arthroscopy. The most commonly used glenohumeral portals are: the posterior, anterior, 5 o'clock, antero-supero-lateral, port of Wilmington and posterolateral portals. Once the posterior portal is established, we create all other portals with an outside-in technique, using a spinal needle to determine the proper angle of approach before making the skin puncture. The most commonly used subacromial portals are: the posterior lateral, anterior, modified Neviasser and subclavian portals.

One of the greatest advances in shoulder arthroscopy over the last decade has been the explosion of procedure-specific instrumentation. Choose the instrument which minimizes the secondary injuries-big holes in the reconstructed structures. Using an instrument, try to not cause the tension mismatch created particularly in the muscle-tendon segment.

The most reconstructive shoulder procedures require a method of securing the soft tissue to bone to create a stable construct. One simple method of minimizing suture cut out through tendon is to increase the number of fixation points in the repaired construct. Most of the anchors on the market have sufficient pull-out strength for clinical usage, particularly when placed at an appropriate deadman angle. We can maximize pull-out strength by inserting anchors into the bone at the optimal angle explained by the Deadman Analogy. Remember, that too many high-profile knots can be a reason of "knot impingement".

Understanding and recognizing pathology is possible under one basic condition – knowing the anatomy and biomechanics of the shoulder. The basic principles that you can never forget are: always make the preoperative plan, a portal positioning can be "your best friend or your worst enemy", to fix some structures you must first see them, identify body landmarks (i.e. the coracoid, scapular spine, coracoacromial ligament), create space, improve exposure, mobilize the injured structures, prepare the bone bed, but gently treat the compact bone, insert properly anchors, always pass the sutures to the same portal using "magic grasper" and tie the best way you can, always checking before tying.

Tips and tricks of shoulder arthroscopy may include: visualization is essential; to minimize potential bleeding in the shoulder build a relationship with an understanding anaesthaesiologists and keep patient's systolic blood pressure below 100 mm Hg; remove all overlying tissues on the first pass to avoid damaging of sutures by the shaver if you are forced to repeat the debridement; use as many portals as you need, don't hesitate to make an additional portals to ensure the correct angle of the approach, including making separate small incisions for each anchor; don't hesitate to change position of the camera in portals for a different view; learn to evaluate the structures in many planes, use always the spinal needle to ensure the correct angle of the approach; first of all, we prefer to insert all anchors and then pass all sutures before tying; that maximizes fixation and ensures the placement of the anchors and sutures in the ideal positions.

Tips and tricks of suture organization may include: use double- or triple-loaded suture anchors with different colored sutures (nowadays it is the standard); when you pass sutures from each anchor it is important to use the same protocol every time; to help organize suture, it is a common practice to use hemostats to match pairs of sutures together

or all the sutures from one anchor together (this technique can be really helpful); if you cannot find the suture use the knot pusher sliding from the free end; try to avoid of unloading anchors and remember that the easiest way to prevent unloading of an anchor is consistent viewing of the suture anchor eyelet as the suture is being pulled – as long as the suture is not pulling through the eyelet, the anchor will not unload; if you unload the anchor it can happen) and one suture still remains in the anchor eyelet, reload the anchor (to make it double loaded again) by using the remaining suture as a shuttle; to reach this purpose – use a straight needle to pass free suture through the still loaded in anchor suture; if you unload the anchor completely but the suture loop is visible and accessible above the bone use PDS suture as a shuttle and reload anchor; in a poor bone an anchor fixation can be problematic, you can use bigger size of implant or insert below the unstable anchor the new one – “Buddy anchor technique”, you can also stabilize the unstable implant inserting another one using “suture bridge technique”; tying knots in a cannula is much easier than without, but remember sometimes sutures can block in cannulas valves during passing by sharp instrument; learn at least one non-sliding and one sliding knots to make your surgery nicer; avoid leaving sutures for a long time on the armpit’s skin because of a possibility of *Propionibacterium acnes* infection.

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SHORT COMMUNICATION

COMPLICATIONS AFTER PROXIMAL HUMERAL FRACTURES

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SUMMARY

An analysis of the current state of the complications and difficulties in the treatment of proximal humerus fractures shows that there are still no effective repetitive methods for the shoulder function restoration. There is ongoing discussion about how to fixate fractures. There is still a dispute about, if there is need to fixate the fracture at all cost or use of the prosthesis and which one. How to treat young people with multifragmentary fractures? Everyone dealing with the problem of fractures of the proximal humerus emphasizes, that results depend on good diagnostic radiology with comprehensive analysis of CT scans and the experience of the surgeon. It is also noted that proceeding operations without suitable preparation of material and endoprosthesis should not be carried out.

Keywords: proximal humerus fractures, surgery

The treatment of proximal humerus fractures still remains a significant challenge. The displacement of fractures display a reasonable indication for the operative treatment. Various types of fractures treatment can be employed on a daily basis. Nowadays, the most common treatment uses locking plates and intramedullary nails, as stipulated by the ORIF procedure. One can also use a minimal invasive techniques with relative stability. In this case, the preferred way is to close reduction and fixation of the fracture, with various systems based on the use of K wires. According to many authors, multi-fragmentary fractures are an indication for the primary arthroplasty. The debate about the choice of implants is still ongoing: hemiarthroplasty, reverse total arthroplasty, cemented or uncemented stems. There is still no unanimity regarding the treatment of Neer IV fractures among different age groups of patients. In recent years, there is more support for the argument that conservative treatment is as effective but complicated surgical procedure. Proof of this lies in the numerous meta-analysis that not only evaluates the techniques of treatment, but also the use of implants, cost of hospitalization and treatment of complications.

The specifics of proximal humerus fracture

Reasons of failure and complications in proximal humerus fracture treatment is a result of the anatomy. Recreating a proper outline shape of the bone is as important as effective stabilization of tuberosities with the rotator cuff, both of these present the main challenges which directly impact the final outcome. In the case of multi-fragmentary fractures, every mint fragment of bone is important as attachments of the rotator cuff. The first problem that needs solving is how to reduce displaced fragments, the next one is how to maintain primary reduction until the stage of final fixation. Morphology of the fracture forces us to use monocortical screws, which are not effective enough in spite of additional stabilization in the plate or nail.

Crushing of fractures result in a significant loss of the cancellous layer and therefore, a lack of support for the bone fragments after repositioning. For older people, there is the problem of poor bone quality, which increases the risk of further destruction of small fragments during the reposition and fixation. These difficulties add to the complexity of the stabilizing procedure. Muscle force acting on surrounding fractures and large lever

arm are often the cause of secondary loss of reduction. It is often not possible to maintain the principle of ORIF – stable fixation and early mobilization as a condition of the returning of shoulder joint function.

Complication in osteosynthesis

Locking plate fixation

The aim of this fixation is to attach plates with angular stability to the distal part of the humerus shaft, using cortical screws. In epiphysis, it is performed by the introduction of multidirectional screws to the bone fragments with their additional fastening of the plate holes through the threaded head of the bolt or the appropriate shape of the hole and the head. As a result, it forms a rigid spatial arrangement intended to provide good stabilization of the fragments. The most common intra-operative failures are associated with the wrong reduction, difficulties in maintaining a proper reposition during the definitive stabilization of bone fragments with screws. Omni-directional arrangement increases the risk of penetration of the screw into the joint. Rotation of the C-arm is often insufficient to assess the alignment of screws, and rotation of the humerus can cause displacement of the temporarily stabilized fragments. Too short screws and screws which are not drilled deep into the head of the humerus may increase the risk of destabilizing fragments both in the early postoperative period and during mobilization. Osteoporotic bone is not able to cope with mechanical stresses during rehabilitation, resulting in the destabilization of the fixation.

Intramedullary nails

Currently, there are two types of intramedullary nails. Firstly, anatomic nails, which have an entrance point at the greater tuberosity and can be only used for two part fractures. The second type is a straight nail which enters at the articulate surface and the anchor in the humeral bone head. Medialization of fixation reduces the shear forces and allows multidirectional insertion of screws and stabilization of the main parts, especially the smaller tuberosity, which is often not possible with the plates. Fixation is flexible. In spite of more biological concepts, the frequency of complication is not lower than in the case of plate fixation.

Other types of fixation

Other methods are based on closed reduction, by multi-directional percutaneous introduction of Kirchner wires or flexible intramedullary rods. Sometimes K wire serves as joystick, allowing the reduction. This type of fixation only provides the relative stability. Often malreduction or early destabilization occurs especially when early rehabilitation is in progress. Other complications include perforation of fragments with irritation of the acetabular articular surface. Bacterial infections often occur around K wires. This condition is particularly disadvantageous because it requires the urgent removal of material to heal the infection. Then loss of reduction occurs along with a recurrence of pain and dysfunction of shoulder. Subsequent operations to restore shoulder function are frequently burdened with a higher risk of recurrence of inflammation.

Late complications

Late complications are associated with nonunion and pseudoarthritis. Adverse effect of shear forces and a large lever arm ultimately lead to the destruction of material and the secondary displacement of fragments. From the moment of surgery, the competition between biology and mechanical strength of the bonding material can be observed. In the case of union, the type of fixation loses any meaning. Multi-fragmentary fracture and extensive aggressive surgical treatment increase the risk of aseptic necrosis of the humeral head (AVN). It was proven that in case of 4-part fractures AVN occurs in approximately

75% of patients, twice more in relation to 3-part fractures. The common denominator of all complications is a pain, which makes it impossible to conduct any rehabilitation and leads to a progressive limitation of joint movement.

The analyzes of different fixation methods highlights that the best results are achieved while using Philos plates. The results of using intramedullary straight nails are slightly worse, nevertheless, both methods displayed 30–50% of complications, depending on the research of different authors. Such a large percentage of complications (especially in the case of 4-part fractures in the Neer classification) caused a dynamic development of the shoulder arthroplasty.

Initially it seemed that replacement of the damaged part of bone with the hemiprostheses would solve the problem, however, it soon became clear that in order to restore the normal shoulder function, the rotator cuff must be effectively restored and fixated to the humerus. Attempts to sew tendons with bone fragments into the special holes of the prosthesis proved to be ineffective. There are many methods and even systems which are supposed to maintain the restored rotator cuff until the bone has healed.

However, even in these cases the biology wins. It turned out that opposing forces of the rotator cuff muscles and the large lever arm of the upper limb often destroy the sewing of the tuberosities and lead to their secondary displacement. It has been discovered that such a situation is caused by inaccuracy of rehabilitation. As a result, different algorithms of rehabilitation were created. The most popular are immediate, post-operative initiation of passive movements, often with the use of appropriate motor rails. A lack of satisfactory results prompted some surgeons to immobilize the shoulder for 4–6 week until there was a union of the tuberosities with the humerus.

There is still no consensus regarding the methods of postoperative immobilization of the shoulder. Some surgeons stress the need for using abduction orthosis, others recommend a simple Dessault orthosis. Daily practice showed a lack of efficiency in these methods and still a large percentage of complications, particularly the secondary displacement of the tuberosities. Furthermore, despite many efforts, a satisfactory range of motion (more than 90 degrees of abduction and flexion) was rarely achieved. The rotational range of movements is also insufficient. Some of these problems are caused by the so-called overflow of subacromial space. This complication is associated with improper intraoperative determination of prosthesis size and version or incorrect sewing of the rotator cuff. Consequently, a mechanical conflict arises between the complex prosthesis-rotatory cuff and the acromion.

Operational difficulties and disappointing results of using hemiarthroplasty accelerated the development of reversed prostheses. At the heart of their creation is a statement about the impossibility of effective restoration of the rotator cuff, leading to permanent impairment of shoulder. Appropriate design of the prosthesis and the normal function of the deltoid muscle are supposed to eliminate weaknesses of hemiarthroplasty. The downside is the need to expand surgery for acetabular component. Practice has shown that it is the acetabular component what is the weakest link and most often it is damaged or loosened. The main role plays shape of acetabulum, its possible deformations and bone quality. Not taking into consideration those elements leads to destabilization and complications in the short term. Opponents underline contradiction in the assumptions of the prosthesis, which should eliminate the lack of potential union of tuberosities in the elderly with uncritical faith in the good condition of the acetabular bone. Doubts seem to be more reasonable as the majority of fractures of the proximal humerus among elder patients is caused by osteoporosis.

SHORT COMMUNICATION

RESTORATION OF SHOULDER MOTION AFTER BRACHIAL PLEXUS INJURIES

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Brachial plexus injury (ICD-10: S14.3) – peripheral nerve trauma at the level of neck and shoulder, which is characterized by a rough dysfunction of upper extremity, in most cases leads to disability. According to the literature, it constitutes 1.2% of all polytrauma, and in 2012 it increased by 30% compared to 2009. In 41% of cases, it refers to high level of damage at C5-C6 roots, that innervate the major muscle groups of the shoulder joint (deltoid muscle, rotator cuff, scapular group, and axillary-humeral group). According to A. Berger (1997), about 25–30%, and reports of Scottish National Brachial Plexus Injury Service (2009–2010) about 12% of patients (including 7% after neurotisation, and 5% as a primary treatment) require the orthopedic correction.

Standard treatment strategy are: Stage 1 (up to 6 months after injury) – revision of brachial plexus with all appropriate neurotisation procedures. Stage 2 (3 months after the 1st surgery) – free active muscle flaps transposition. Stage 3 (1 year after 2nd operation) – carpal joint fusion. Stage 4 – muscle transposition, and shoulder joint fusion if it is impossible to restore its movements.

Depending on the muscle groups involvement, several types of reconstructive orthopedic surgery were identified. Dysfunction of the deltoid muscle (with intact rotator cuff and scapular muscle group): transposition of m. latissimus dorsi into position of deltoid muscle, trapezoidal muscle transposition by Saha, Ober operation (transposition of long head of the triceps and short head of the biceps to the acromion). Deltoid and rotator cuff dysfunction: transposition of the trapezius muscle by Saha, L'Episcopo operation, Hoffer operation, and modified quad procedure, or shoulder joint fusion. If internal rotation of the upper limb retains: Fairbanks operation, L'Episcopo operation, Zachary operation, Green-Tachdjian operation, Ingram operation, Hoffer operation, Pearl operation, or derotation osteotomy of the humerus is performed. If all three groups of muscles (deltoid, rotator, and scapular) are denervated: transposition of the trapezius muscle on the humerus by Saha, transposition of contralateral trapezius muscle to the insertion point of the rhomboid muscles on scapula, and transposition of the pectoralis major to serratus anterior, or shoulder joint fusion. In our practice we used needle EMG, to determine the dynamics of denervation-reinnervation processes that greatly reduced the time to make right decision.

Indications for shoulder joint fusion are: irreversible paralysis of deltoid and rotator cuff muscles, while maintaining strength of m.serratus anterior at the level of M3 and more. Long-term results of shoulder joint fusion were evaluated complexly: active abduction of shoulder-scapula segment to the angle 55–65° was achieved in 31.3% of cases, 50% of patients got 40–50° of abduction, and to the angle of 30–35° arm abducted in 18.7% of patients. In two patients – fusion of the shoulder joint did not happen, which was associated with early prohibited ending of cast immobilization. Long-term effects of shoulder joint fusion were evaluated on a Simple Shoulder Test scale – the average score of shoulder function was 57.5%.

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