NON-OPERATIVE TREATMENT IN SHOULDER PAIN. EVIDENCE BASED MEDICINE APPROACH
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SUMMARY
Introduction
The pain is one of the most common symptoms of shoulder injuries or its disorders. Therapeutic teams can choose the best option for their patients from many treatment methods. Not all of them are scientifically evaluated.

Aim
The aim of this study is to determine which of the non-operative methods of the shoulder pain treatment are proved as effective in the literature.

Methods
The review of available Evidence Based Medicine literature on non-operative methods of shoulder injuries treatment.

Results and conclusions
The most effective therapy techniques towards pain in shoulder are pharmacological treatment (corticosteroid injections, non-steroidal anti-inflammatory drugs), physiotherapeutic exercises (stretching, shoulder muscle balance exercises, eccentric training), manual therapy (muscle relaxation techniques, myofascial trigger points therapy). Physical therapy procedures may improve the final results of conservative treatment.

Keywords: shoulder pain, non-operative treatment

LECZENIE NIEOPERACYJNE W ZESPOŁACH BÓLOWYCH BARKU. PODEJŚCIE OPARTE O DOWODY NAUKOWE MEDYCyny
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STRESZCZENIE
Wprowadzenie
Ból jest jednym z najczęściej występujących objawów uszkodzeń barku. Zespoły terapeutyczne mogą wybrać najlepszą opcję z wielu metod leczenia dla swoich pacjentów. Nie wszystkie z nich zostały ocenione w oparciu o dowody naukowe.

Cel
Celem tej pracy jest próba określenia skuteczności metod nieoperacyjnych w leczeniu bólu barku w świetle dostępnej literatury.

Metody
Przegląd dostępnej literatury opartej o Evidence Based Medicine na temat nieoperacyjnych metod leczenia uszkodzeń barku.

Wyniki i wnioski
Najskuteczniejsze techniki terapii w leczeniu bólu w obrębie barku stanowią leczenie farmakologiczne (iniekcje korykosteroidów, stosowanie niesterydowych leków przeciwzapalnych), ćwiczenia fizjoterapeutyczne (stretching, ćwiczenia równowagi czynności mięśni barku, ćwiczenia ekscentryczne), terapia manualna (techniki relaksacyjne mięśni, terapia powięziowych punktów spustowych bólu). Procedury fizjoterapeutyczne wspomagają poprawę ostatecznego wyniku leczenia zachowawczego.

Słowa kluczowe: ból barku, leczenie nieoperacyjne
Introduction
The International Association for the Study of Pain defines pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (Merskey 1994). This sensation is always subjective. Contemporary wide range of therapy towards the shoulder pain is described.

In subacromial impingement syndrome, pain is usually connected with inflammation and soft tissues compression due to changes in subacromial space (Morrison et al. 1997; Perez-Merino et al. 2011). In the first phase after rotator cuff tear, the pain is a result of tissues injury and inflammatory response. Later it can change into chronic pain (Dessem and Lovering 2011). After shoulder dislocation and reduction, the pain appears usually as result of muscle spasm and inflammation. It is also caused by injury of soft tissues (Blackburn and Guido 2000; Leggin et al. 2011). In cases of “frozen shoulder” also the end of the range of motion exercises causes pain apart from inflammatory reaction.

There are additional factors predisposing to the shoulder pain like overweight (especially abdominal obesity), diabetes mellitus and smoking. In general, these factors affect both genders similarly (Rechardt et al. 2010).

Aim
The aim of this study is to determine the non-operative methods of the shoulder pain treatment that are proved as effective in the literature.

Methods and results
Injections/Nonsteroidal anti-inflammatory drugs
Decreasing of inflammation in subacromial space is one of the most important goals especially at the beginning of the therapy. It allows healing of involved tissues (Morrison et al. 1997). In the primary health care, usually nonsteroidal anti-inflammatory drugs are prescribed (Van Der Windt et al. 1995). Petri et al. (1987) compared oral NSAIDs with placebo and showed significant improvement in NSAIDs group after 2 weeks. However, after 4 weeks of treatment this difference was not statistically significant. Other reports also showed short term efficacy of NSAIDs application (Van Der Windt et al. 1995). Cummins et al. (2009) showed that NSAIDs connected with rehabilitation program are effective in 79% of patient with subacromial impingement. Corticosteroid injections are significantly more effective than NSAIDs (Van Der Windt et al. 1995). Rhon et al. (2014) noticed that in subacromial impingement syndrome treatment subacromial corticosteroid injection can give similar result as manual therapy. The best effects appears after one months, after this period improvement reached the constant level. Other clinical researches proved that in rotator cuff tendinopathy, corticosteroid injection gave similar effect as transcutaneous electrical nerve stimulation (TENS) and provided the immediate pain reduction (Desmeules et al. 2015). If the pain of the long head of the biceps tendon is diagnosed in tests with the injection, it should be addressed to bicipital groove (Provencher and Romeo 2012). The pain in acromioclavicular joint can be treated with the corticosteroid injection (Provencher and Romeo 2012). Diagnostic aspect of corticosteroid injection is also very important in identification of the source of the pain, improvement after administration means that proper tissue/structure was addressed (Provencher and Romeo 2012).

Immobilization
Short-term immobilization (2–4 weeks) allows for tissues healing and the pain control.
Decrease of ROM, deterioration of joint proprioception and muscle atrophy may develop if immobilization is too long (Dessem and Lovering 2011). That is why it is important to use immobilization as short as possible and as long as it is necessary.

**Manual therapy**

Rhon et al. (2014) showed that manual therapy can give similar results as corticosteroid injection especially at the beginning of subacromial impingement conservative treatment. Systematic review reported that muscle relaxation with manual soft tissue therapy and joint mobilization give satisfactory effect in subacromial impingement therapy (Michener et al. 2012). Muscle relaxation applied to trapezius, pectoralis minor, levator scapulae seems to be effective in treatment of pain associated with rotator cuff tears (Collin et al. 2015). Trigger points therapy is one of the best-described types of manual therapy. Trigger points are defined as local points that are painful on compression, can produce referred pain in reference zones and gives muscle hypertension (Bron et al. 2011a, 2011b). Trigger points are also responsible for myofascial pain (Simons 1999). Myofascial trigger points compression with tight muscle relaxation massage techniques and ice cube massage gives good results in chronic shoulder pain (Bron et al. 2015). The most common trigger points in shoulder are localized in upper and lower trapezius muscle, anterior deltoid muscle, infraspinatus muscle (Figure 1a–c) (Simons 1999).

**Exercises**

Pain is usually associated with increased tension of muscles. Muscle stretching and active relaxation techniques (postisometric relaxation) are helpful in pain reduction (Morrison et al. 1997; Michener et al. 2004). Exercises, which normalize dysfunctional patterns of motion and restore muscle balance between deltoid muscle and humeral head depressors are recommended in shoulder pain treatment (Michener et al. 2004; Collin et al. 2015). Usually eccentric contraction is responsible for muscle injury, but the same contraction can also provide significant protection against the future injury due to increasing number of sarcomeres and normalization of tendon structures (Ohberg et al. 2004; Dessem and Lovering 2011). During eccentric muscle training the fibroblasts activity increases, collagen formation is facilitated and collagen structure is remodeled (Camargo et al. 2014). Many researchers proved that pain treatment with eccentric muscle training is effective in patients with Achilles tendinosis (Ohberg et al. 2004; Chester et al. 2008). Other clinical trials have shown that eccentric training of supraspinatus, infraspinatus and deltoid muscles is helpful in pain reduction in patients with subacromial impingement (Jonsson et al. 2006; Bernhardsson et al. 2011). Maenhout et al. (2013) have compared the effectiveness of traditional rotator cuff strengthening with rotator cuff training combined with eccentric exercise and with increasing load by dumbbells. The eccentric program involved heavy loads. In isometric abduction, the evaluation of eccentric

![Figure 1. Location of trigger points and referred pain in (a) upper and lower trapezius, (b) anterior deltoid, (c) infraspinatus muscles. Modified after Simons (1999).](www. irons.com.pl)
training group recorded higher results, but improvement in SPADI score was slightly better in traditional training than in eccentric training (no statistical significant differences were detected) (Maenhout et al. 2013). It can be concluded that the load in eccentric training is important, if it is too heavy, the result may be not satisfactory.

Physical therapy
Transcutaneous electrical nerve stimulation is one of the best scientifically proved modality. It is effective in patients with shoulder instability (Blackburn and Guido 2000). Desmeules et al. (2015) showed that one TENS session provide immediate pain reduction similar to corticosteroid injection in patients with rotator cuff tendinopathy. TENS in combination with ultrasound are helpful in frozen shoulder treatment (Page et al. 2014). Pérez-Merino et al. (2015) proved that there are no differences in pain scored with Visual Analog Scale results between application of ultrasounds, phonophoresis and iontophoresis (with dextropropfen) after one month therapy. However other systematic review denied effectiveness of ultrasound (Michener et al. 2004).

Conclusions
Wide range of the shoulder conservative pain therapy is described in the literature. It allows choosing the best option for patients. In some cases it might cure the patient, in other, to better prepare the patient for surgery.
REFERENCES
Petri M., Dobrow R., Neiman R., Seaman W.E. Randomized, double-blind, placebo-controlled study of the treatment of the painful...

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