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Arthroscopic treatment for snapping scapula: a prospective case series

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Abstract

Purpose Painful snapping scapula can be a disabling condition. The object of this prospective study was to assess the efficiency of arthroscopic bone resection of the medial superior corner of scapula, in patients suffering from continuously painful snapping scapula.

Methods Twenty patients with painful snapping scapula underwent arthroscopic scapulothoracic bursectomy and resection of the hook formation at the medial superior margin of the scapular. Preoperatively, all patients reported temporary relief via a local anesthetic injection and had completed a 3-month rehabilitation program. The Western Ontario Rotator Cuff index (WORC) was used for the assessment of pain and function levels both pre- and postoperatively.

Results Twenty patients (13 women and 7 men) were included. The mean follow-up was 2.9 years (range 2–5 years). The mean age was 40 years (range 19–68 years). The mean duration of symptoms was 4 years (range 4 months–20 years). Seven previously had arthroscopic operations in the affected shoulder with acromioplasty, with or without acromioclavicular joint resection. The median preoperative WORC score was 35.0 (range

18–74) and significantly increased to 86.4 (range 33–100) postoperatively. Out of 20 patients, 18 improved and 19 indicated that they would undergo the surgery again.

Conclusion In this study, it was found that, among patients troubled by painful snapping scapula and without relief by exercise-based rehabilitation, arthroscopic resection of the medial superior hook formation in combination with partial bursectomy provides a serious gain in respect to the WORC score and is believed to be an effective treatment in most cases. One patient had a serious complication.

Keywords Snapping scapula · Bursitis · Shoulder pain · Arthroscopy · Bursectomy · Scapula

Introduction

Snapping scapula is crepitus between the scapula and the chest wall. It is not a rare phenomenon, but it seldom becomes painful [1]. The etiology of painful snapping scapula is caused by scapular dyskinesia in the majority of the cases; however, in some cases, bony or soft-tissue abnormalities can cause the pain [2–4]. Scapular dyskinesia, with resulting alterations in the static scapular position and loss of dynamic control of scapular motion, is commonly found in association with a variety of shoulder injuries [5]. The scapular dyskinesia results in an increase in anterior tilt, a decrease in scapular upward rotation, and an increase in scapular internal rotation. The anteriorly tilted scapula compresses the medial border against the ribs, and the scapula pivots around its medial border rather than sliding laterally. In most cases, there is an absence of radiological definable changes. The dyskinetic position and motion is associated with the disruption of the coupled scapulohumeral rhythm [6, 7]. In some cases, there are

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more structural causes for the scapula rubbing across the ribs, such as Luschka's tubercle, which is a prominence of bone or fibrocartilage at the superomedial angle of the scapula. In addition, an excessive forward curvature of the superomedial corner or an osteochondroma can be causal factors. Several other less common etiologies for snapping scapula have been described, including malunited fractures of the scapula or the ribs, chondrosarcoma, or elastofibroma dorsi [3, 8–13]. Most frequently, the snapping occurs at the superior medial border and secondly at the inferior pole. When the snapping is caused by scapular dyskinesis or structural bony deformations, the rubbing against the rib cage leads to inflammation of the bursa and, over time, a more chronic bursa with scarring is formed. For some patients, this situation will be disabling and painful, while others will remain asymptomatic. Symptomatic patients troubled by scapular pain typically describe clicking, crunching, grating, or snapping sensations, sometimes with referring neck pain and tingling sensations in the affected arm in relation to activities. Some patients experience aggravated pain when sitting in chairs, as a result of compressing their shoulder blade against the seat back. It is generally accepted that conservative treatment, consisting of physiotherapy-guided restoration of the normal kinematic of the scapula, in combination with rest, ice, nonsteroidal anti-inflammatory medications, and eventually injection with corticosteroids, must be attempted before surgery is considered [6, 9, 14, 15]. In order to restore normal scapular kinematics, the physiotherapy consists of stretching tight anterior structures, such as the pectoralis minor, and exercises for strengthening the lower trapezius and serratus anterior, in combination with core stability exercises [7].

When rehabilitation has failed, both open and arthroscopic surgery can be indicated and subsequent studies have reported good results [3, 16–24]. Arthroscopic surgery has the advantage of being a minimally invasive surgery, resulting in a lesser scar, a lower risk of infection and faster rehabilitation, in comparison with the open surgery [16–18, 20]. Furthermore, the arthroscopic method requires less detachment of the serratus anterior, so that the bony spur can be reached. Few studies have assessed the outcome after scapulothoracic arthroscopy and only Harper et al. have prospectively evaluated this using six cases [20]. However, the length of follow-up was not acknowledged. Therefore, the primary goal of this study is to provide further insight into this topic by performing a prospective follow-up after arthroscopic bony resection of the medial superior corner of scapula in a cohort of patients with painful snapping scapula and to evaluate whether the demographic data such as age, gender, and duration of symptoms influence the outcome.

Methods

The following inclusion criterion was defined: scapular pain and a snapping sensation at the upper medial part of the affected shoulder blade. Shrugging at the medial superior side of the scapular should be observed by the examiner, and when the scapula was compressed against the chest wall, the usual pain should be provoked. Furthermore, the symptoms should be transiently reduced by injection of one or more treatments, including corticosteroid and 5–10 ml of 0.5 % Bupivacaine. Patients must have completed a physiotherapy-guided rehabilitation program consisting of relevant exercises for restoring scapular kinematics for a minimum of a 3-month period; however, the majority of patients have trained for more than 1 year. The patients were trained by various physiotherapists and asked specific for what type and to what extent the exercises were performed. In some cases, further and more extended physiotherapy-guided exercises were prescribed. Patients with only a minor or transient improvement of painful snapping scapula were included. The final inclusion criterion was a preoperative Western Ontario Rotator Cuff index (WORC) score needed to be fulfilled.

No validated disease-specific score for the evaluation of painful snapping scapula exists. After having evaluated different shoulder scores, we found the WORC as a self-reporting score, to be most appropriate for this condition. It was used to evaluate the level of complaints before the operation and at a 3 month and final follow-up [25]. It contains 21 items across five domains (physical symptoms, sports/recreation, work, lifestyle, and emotions). Responses are recorded on a visual analog scale and range from no pain to extreme pain. The WORC scores can vary from 0 %, as the lowest functional status level, to 100 %, the highest functional status level. Patients were re-examined at follow-ups, and they were requested to recall the number of weeks before the shoulder had regained the preoperative level of pain, as well as whether they would undergo scapulothoracic arthroscopy again. Two patients that could not be located from the national register were lost for follow-up and were not included. Other pathologies of the affected shoulder were excluded by history and clinical examination. Preoperatively, radiographs with Y-view, MRI/MRA scans, CT scans, sonography, EMG analysis had been used unsystematically. A bony formation on imaging was not an absolute criterion for inclusion. Figure 1 demonstrates a normal CT scan, in a patient having painful snapping scapula. No exclusion criteria were defined.

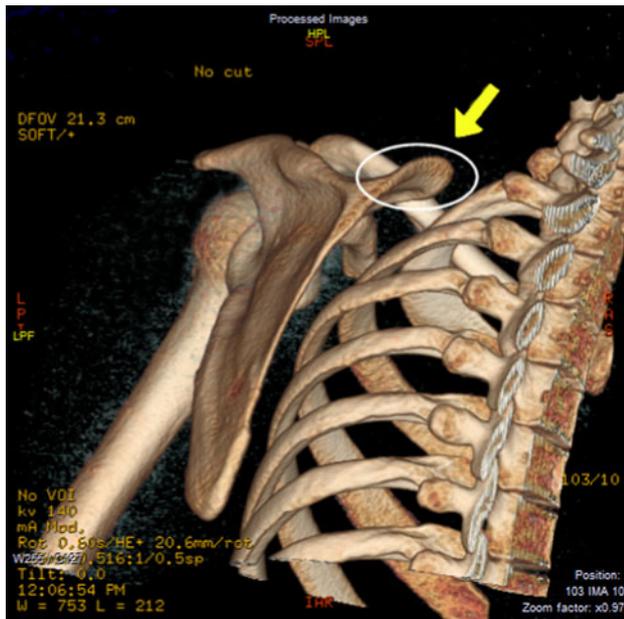


Fig. 1 This demonstrates a normal CT scan from a patient with painful snapping scapula. The arrow points to superior medial border. The bony abnormalities are most frequent localized in this area

Operative technique

All patients underwent arthroscopic scapulothoracic bursectomy and resection of the hook formation at the medial superior margin of the scapular. They were placed in the lateral decubitus position with stabilizing supports in the back and front of the pelvis and with the head of the bed angled up to approximately 30°. The scapula, shoulder, and arm were draped free. The arm was placed into full internal rotation with the hand placed on the back in the “chicken wing” position, so that the scapula lifted up from the chest wall. The bony landmarks of the superomedial angle of the scapula, the scapular spine, including the acromion, and the medial border were drawn out. The position for the superior portal was marked out at the junction between the medial and middle thirds of the line between these two points [26–28]. The medial portal was marked 2 cm medial to the medial border of the scapula, just below the line of the scapular spine. One or two needles were used to mark the center of the superomedial corner of the scapula. The arthroscope was then introduced through the medial portal into the scapulothoracic space. Using an inside-out technique, it was then directed superiorly to exit in the region of the previously marked superior portal. See Fig. 2. Initially, chronic bursa tissue was resected using either a radiofrequent wand or a shaver, followed by the soft tissue, mostly including some muscle fibers from the serratus anterior was removed from the deep surface of the superomedial corner of the scapula. See Fig. 3. A resection of bone in the safe zone was then

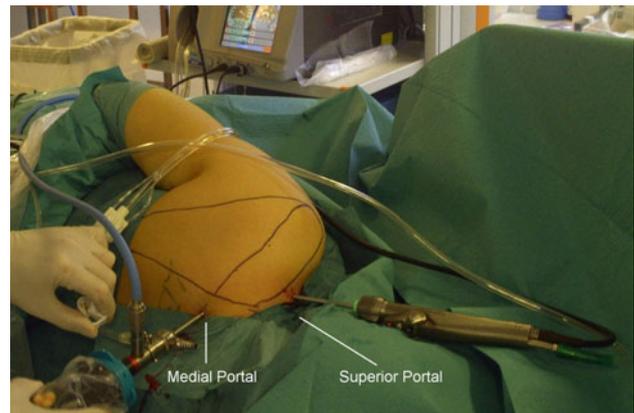


Fig. 2 This demonstrates the standard portals for scapulothoracic arthroscopy. With the arm placed into full internal rotation with the hand placed on the back in the “chicken wing” position, so that the scapula lifted up from the chest wall

carried out until the corner appeared flat compared with the rest of the scapula [26]. Postoperatively, the arm was placed in a sling and exercises were commenced on the first postoperative day. The patients were encouraged to achieve full active movement of the shoulder within 1 week. Postoperative rehabilitation focused on re-establishment of the scapular kinematics. The surgery was done by the same experienced arthroscopic orthopedic surgeon, on an out-patient basis.

Statistical analysis: Pre- and postoperative clinical findings were compared using the Wilcoxon signed-rank test. Spearman’s rho test was used for the correlation between different outcome parameters and demographic data. Outcome parameters at 3-month follow-up and final follow-up were compared using paired *t* test. The significance level was set at $P < 0.05$.

Results

Twenty patients (13 women and 7 men) were included. The mean follow-up was 2.9 years (range 2–5 years). The mean age was 44 years (19–68 years). The mean duration of symptoms was 4 years (4 months–20 years). Seven patients had previously been operated on arthroscopically in the affected shoulder with acromioplasty, and two had a subsequent acromioclavicular joint resection. In two cases, a specific trauma had initiated the pain and in the rest of the cases, a more insidious onset was reported. In one case, an osteochondroma at the medial margin of the scapula was observed on MRI, and the radiologic examination revealed no bone formations in the rest of the cases. A significant improvement was observed in the WORC score with a median preoperative score of 35.0 (range 18–74) and a final postoperative score of 86.4 (30–100), see Fig. 4.

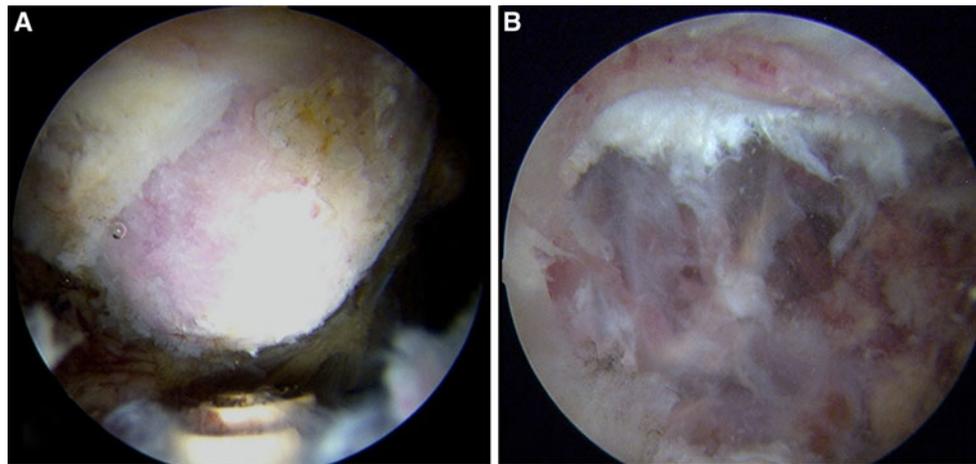


Fig. 3 Intraoperative arthroscopic views before and after resection of the hook formation at the superomedial margin of the scapula. **a** Demonstrates debridement of the hook formation using a radiofrequency wand from the superior portal. **b** After the resection is finished

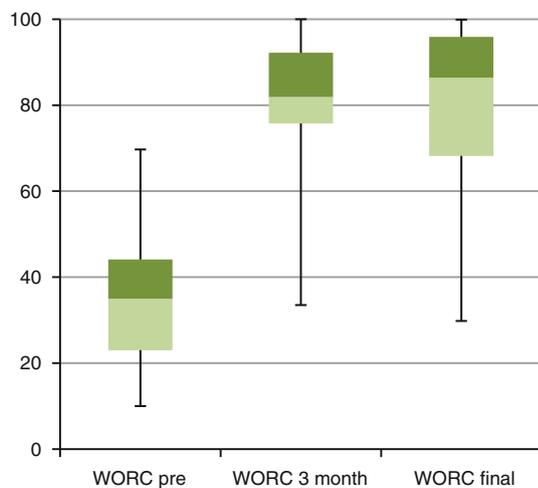


Fig. 4 Pre- and postoperative WORC scores at 3 month and final follow-up, with minimum, quartile, median, and maximum values

No significant difference was found between 3-month follow-up and final follow-up ($P = 0.15$). A median number of 6 weeks (2–16) was reported before the shoulder had regained the preoperative level of pain. Out of 20 patients, 19 indicated that they would undergo surgery again. No significant correlation was found between the outcome and the demographic data (age $P = 0.4$; gender $P = 0.5$; duration of symptoms $P = 0.8$). Two patients reported worsening of their symptoms postoperatively. One of these patients had a severe chronic atrophy of the trapezius muscle after an iatrogenic lesion of the accessory nerve following gland removal 50 years before. The painful snapping scapula had lasted for 3 years before surgery but the patient also had a partial lesion of the supraspinatus tendon diagnosed by MRI, which was scheduled for a cuff repair. One patient reported that the postoperative physiotherapist-guided exercises were far more relevant and

effective compared to the preoperative exercises. In addition, this patient had changed physiotherapist, which made him doubt whether it was the surgery or the physiotherapy that had caused the improvement.

A complication occurred in one patient out of the series. This patient did not fulfill the inclusion criteria because of a missing preoperative WORC score. Postoperatively, this patient developed scapula winging due to a paralysis of the long thoracic nerve. At the first postoperative follow-up 4 weeks after the operation, the patient reported light pain in the affected right arm and hypoesthesia around the shoulder girdle and scapula, but the preoperative symptoms had disappeared. A winging scapula was not noticed at that time. Three months postoperatively, the patient reported increasing pain and a winging scapula was diagnosed. An EMG recording 6 months postoperatively showed a partial lesion of the N thoracicus longus with no signs of demyelination. After 4 years without remission, a reconstructive muscle transposition was completed. Apart from this case, no complications were experienced in relation to scapulothoracic arthroscopy.

Discussion

The results from this prospective case series demonstrate that, in respect to patients with continuous painful snapping scapula, despite having completed a physiotherapy program, arthroscopic resection of the medial superior hook formation gives a reduction in symptoms in 90 % of cases. Nineteen out of 20 patients reported that they would undergo this type of surgery again. Unfortunately, no validated scores exist for the painful snapping scapula. At the follow-up, we initially applied the Constant-Murray Outcome score in half of the cases and despite it has become

the most commonly used outcome measure for assessing the outcomes of the treatment for shoulder disorders and it is the recommended scoring system of the European Society of Shoulder and Elbow Surgery (SECEC/ESSE) for shoulder problems, we stopped using it. This was based on the fact that range of movements and strength normally not is affected in this particular group of patients and we found the score insensitive and inappropriate. In contrast to this, we found that the WORC score is a sensitive and appropriate evaluation tool for this particular condition. Since it is a fully subjective score (patient-related outcome), it is our experience that the score helps with the communication between the surgeon and the patient. As a result, it reduces the risks of misunderstanding in respect to the extent of the problem. Because the results of this study are mainly based on a score not used before, a direct comparison to previous studies can be somewhat difficult. However, it seems that our results are in accordance with other case studies [16–24].

In the discussion of pros and cons of arthroscopic versus open treatment, no comparative studies have been performed. However, it is believed that the arthroscopic method has the advantage of being a minimally invasive surgery, minimizing the dissection of muscle, and resulting in less pain, faster recovery rates, and less scar formation.

It is believed that the radiologic criteria for operative treatment for the scapulothoracic bursitis are unclear, especially if no obvious bony abnormality or narrowing between the scapula and chest wall is seen. The costomedial angle between the superior and inferior wings has been measured in relation to a snapping scapula; however, it cannot yet be used as a clinical tool for the decision for surgery [22, 29], and this study did not systematically measure the angle of the scapula. Lethinen et al. indicated that the decision to operate is clinical, based on symptoms and a physical examination, including the response to anesthetic injection into the scapulothoracic bursa, which this study agrees upon [17]. In the current study, all patients had a bony resection; however, Nicholson and Duckworth [23] and Lethinen et al. [17] pointed out that bony resection of the superomedial corner of the scapula may not always be necessary in the treatment for the painful snapping scapula syndrome, and that a bursectomy alone can give satisfactory results to selected patients. Carlson et al. [19] found 89 cases of snapping scapula in their review of the literature, where 16 % were caused by Osteochondroma. However, in the current series, this etiology was only seen in one patient. It is obvious, therefore, that a radiological examination can be helpful for operative planning in these cases.

In the results section, a patient not included in the series was identified with a serious complication. The patient developed scapula winging due to a partial lesion of the

long thoracic nerve, but the pathomorphology for the lesion remains unclear, but it can likely be related to the surgery. Under normal circumstances, during scapulothoracic arthroscopy, there is a reasonably long distance to the long thoracic nerve using the Bell portal and the safe zone [4, 26, 27]. This particular operation proceeded without difficulties, and therefore, a direct trauma to the nerve due to instrumentation seems unlikely, even if this patient has an anatomical variant, but a trauma from the shaveblade through the Bell portal, cannot be excluded. A lesion triggered by the traction of the nerve as a consequence of the positioning or the draping seems more likely. This patient had a subsequent transfer of the Pectoralis major tendon.

Having this and other potential complications in mind, surgery should only be considered if a serious rehabilitation program has failed. It is well known that some patients see surgery as a shortcut and do not have the confidence or the patience for physiotherapy. It is therefore of utmost importance that the surgeon uncovers the type and extent of exercises that the patient used, in order to avoid misunderstandings. To our knowledge, no complications to scapulothoracic arthroscopy have yet been reported.

One patient with a complicated history had a partial supraspinatus tendon tear and his pain was aggravated following the scapulothoracic arthroscopy. Investigations to rule out the source of his pain were possibly not thorough enough. Scapular dyskinesia, with the resulting alterations in the static scapular position and loss of dynamic control of the scapular motion, is commonly found in association with a variety of shoulder injuries, eventually leading to a painful snapping scapula. Even though it can be difficult, it is important to rule out whether the painful snapping scapula is secondary to another shoulder injury as the above-mentioned example indicates.

Several limitations of this study have to be taken into account. No validated score for painful snapping scapula was used and no control group was included. However, the painful snapping scapula is a seldom condition and no epidemiologic data are available. The Danish National Board of Health has estimated that an average of 15 patients annually needs a surgical solution for this condition. Based on this low figure and the geographic diversity, a completion of a randomized study, comparing further conservative treatment for surgery, will be difficult to accomplish. Few orthopedic surgeons in Denmark masters the surgical technique and the patients included in this series were referred from across the country, making a more straight experimental setup difficult. A further limitation was a lack of systematic preoperatively radiologic evaluation of the bony structure of the scapula. Also, no specified preoperative rehabilitation program was defined and six of the patients have previously undertaken

subacromial decompression shoulder surgery in the affected shoulder.

Conclusion

In this study, it was found that arthroscopic resection of the medial superior hook formation in combination with partial bursectomy provided good results with significant gains with respect to the WORC score in 90 % of the patients troubled by painful snapping scapula for a long time and without relief by exercise-based rehabilitation. Therefore, we believe that it is an effective treatment in most cases; however, it has to be emphasized that one patient had a serious complication that likely was related to the surgery.

Conflict of interest None.

References

1. Grunfeld G (1927) Beitrag zur Genese des Skapularkrachens und der Skapulargerausche. *Arch Orthop J Unfall Chir* 24:610–615
2. Millett PJ, Warner JJP (2006) Management of recalcitrant scapulothoracic bursitis : endoscopic scapulothoracic bursectomy and scapuloplasty. *Tech Should Elb Surg* 7:200–205
3. Oizumi N, Suenaga N, Minami A (2004) Snapping scapula caused by abnormal angulation of the superior angle of the scapula. *J Should Elb Surg* 13:115–118
4. Riet RPV, Bell SN, Fa FAO (2006) Scapulothoracic arthroscopy. *Tech Should Elb Surg* 7:143–146
5. Kibler WB, McMullen J (2003) Scapular dyskinesis and its relation to shoulder pain. *J Am Acad Orthop Surg* 11:142–151
6. Manske RC, Reiman MP, Stovak ML (2004) Nonoperative and operative management of snapping scapula. *Am J Sports Med* 32:1554–1565
7. Kibler WB, Sciascia AD, Uhl TL, Tambay N, Cunningham T (2008) Electromyographic analysis of specific exercises for scapular control in early phases of shoulder rehabilitation. *Am J Sports Med* 36:1789–1798
8. Kuhn JE, Plancher KD, Hawkins RJ (1998) Symptomatic scapulothoracic crepitus and bursitis. *J Am Acad Orthop Surg* 6:267–273
9. Kuhne M, Boniquit N, Ghodadra N, Romeo AA, Provencher MT (2009) The snapping scapula: diagnosis and treatment. *Arthroscopy* 25:1298–1311
10. Lazar MA, Kwon YW, Rokito AS (2009) Snapping scapula syndrome. *J Bone Joint Surg Am* 91:2251–2262
11. Ruland LJ, Ruland CM, Matthews LS (1995) Scapulothoracic anatomy for the arthroscopist. *Arthroscopy* 11:52–56
12. Milch H (1961) Snapping scapula. *Clin Orthop* 20:139–150
13. Fukunaga S, Futani H, Yoshiya S (2007) Endoscopically assisted resection of a scapular osteochondroma causing snapping scapula syndrome. *World J Surg Oncol* 5:37
14. Kibler WB (2010) Snapping scapula. *Arthroscopy* 26:299–300 (author reply 301)
15. Provencher MT, Kuhne M, Romeo AA, Ghodadra N, Boniquit N (2010) Author' s reply. *YJARS Elsevier Inc.* 26:301
16. Pavlik A, Ang K, Coghlan J, Bell S (2003) Arthroscopic treatment of painful snapping of the scapula by using a new superior portal. *Arthroscopy* 19:608–612
17. Lehtinen JT, Macy JC, Cassinelli E, Warner JJP (2004) The painful scapulothoracic articulation. *Clin Orthop Relat Res* 423:99–105
18. Pearse EO, Bruguera J, Massoud SN, Sforza G, Copeland SA, Levy O (2006) Arthroscopic management of the painful snapping scapula. *Arthroscopy* 22:755–761
19. Carlson HL, Haig AJ, Stewart DC (1997) Snapping scapula syndrome: three case reports and an analysis of the literature. *Arch Phys Med Rehabil* 78:506–511
20. Harper GD, McIlroy S, Bayley JI, Calvert PT (1999) Arthroscopic partial resection of the scapula for snapping scapula: a new technique. *J Should Elb Surg* 8:53–57
21. Lesprit E, Hued JCL, Moinard M, Schaefferbeke T, Chauveaux D (2001) Case reports Snapping scapula syndrome : conservative and surgical treatment. *Eur J Orthop Surg Traumatol* 11:51–54
22. Lien S-B, Shen P-H, Lee C-H, Lin L-C (2008) The effect of endoscopic bursectomy with mini-open partial scapulectomy on snapping scapula syndrome. *J Surg Res* 150:236–242
23. Nicholson GP, Duckworth MA (2002) Scapulothoracic bursectomy for snapping scapula syndrome. *J Should Elb Surg* 11:80–85
24. Ermiş MN, Aykut US, Durakbaşa MO, Ozel MS, Bozkuş FS, Karakaş ES (2012) Snapping scapula syndrome caused by subscapular osteochondroma. *Eklem Hastalik Cerrahisi* 23(1):40–43
25. Kirkley A, Alvarez C, Griffin S (2003) The development and evaluation of a disease-specific quality-of-life questionnaire for disorders of the rotator cuff: The Western Ontario Rotator Cuff Index. *Clin J Sport Med* 13:84–92
26. Chan B-K, Chakrabarti AJ, Bell SN (2002) An alternative portal for scapulothoracic arthroscopy. *J Should Elb Surg* 11:235–238
27. Bell SN, van Riet RP (2008) Safe zone for arthroscopic resection of the superomedial scapular border in the treatment of snapping scapula syndrome. *J Should Elb Surg* 17:647–649
28. Aggarwal A, Wahee P, Aggarwal AK, Kaur H, Sahni D (2012) Anatomical considerations for safe scapular resection in snapping scapula syndrome. *Surg Radiol Anat* 34:43–47
29. Mozes G, Bickels J, Ovadia D, Dekel S (1999) The use of three-dimensional computed tomography in evaluating snapping scapula syndrome. *Orthopedics* 22:1029–1033