

# Snapping scapula

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## Overview

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- Snapping scapula syndrome is caused by either osseous lesions or scapulothoracic bursitis [3].
- The condition is also referred to as “washboard syndrome” and is attributed to bony and soft tissue abnormalities [9].
- Snapping scapula represents the clinical expression of scapulothoracic impingement due to mechanical factors and/or muscle imbalance [7].
- Osteochondroma of the scapula is a rare entity that may present with snapping scapula syndrome when it alters scapulothoracic mechanics [6].
- Snapping scapula syndrome can be a debilitating disorder [2].
- Diagnosis and management of snapping scapula syndrome remains challenging despite recent advances [1].
- The condition can be difficult to recognize and treat [3].
- Four-dimensional computed tomography scans facilitate preoperative planning by defining pathology and improving assessment of the amount and location of scapular bone and soft tissue causing symptoms [18].

## TREATMENT

- Treatment of patients with snapping scapula syndrome begins with nonoperative methods [5].
- When nonoperative treatment fails, several surgical options exist [5].
- Arthroscopic management of snapping scapula syndrome yields improvement in pain, crepitus, and range of motion in a majority of patients [4].
- Most patients experience residual symptoms following arthroscopic management [4].
- Arthroscopic scapulothoracic treatment provides significant pain relief and functional improvement for painful snapping scapula symptoms not responding to non-surgical treatment modalities [8].
- Arthroscopic treatment for snapping scapula syndrome resulted in significant improvement in pain and function with high patient satisfaction at a mean follow-up of 3.4 years [14].
- Arthroscopic scapuloplasty leads to significant improvement in pain and function in patients with snapping scapula syndrome refractory to conservative treatment [15].

- Arthroscopic surgery is an effective treatment for snapping scapula syndrome in both primary and revision cases, showing significant improvements in all postoperative outcome scores at a mean of 3.4 years [17].
- Arthroscopic resection of the superomedial corner of the scapula is a useful technique in patients whose pain and clicking can be clinically localized and who have failed to respond to conservative measures [19].
- 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 [35].
- At the end of 1 year, all patients in a case series had a constant score above 90 and were completely relieved of snapping around the scapula having full pain-free movements at the shoulder and scapulothoracic joints [11].
- A patient remained asymptomatic with full range of motion and no further complaints of pain or snapping at twenty-six months postoperatively [12].
- At 2 years 6 months after the operation, snapping and pain were completely gone and the patient was satisfied with the results [13].

## Anatomy & Pathophysiology

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### ETIOLOGY AND MECHANISM

- Snapping scapula is the clinical expression of scapulothoracic impingement due to mechanical factors and/or muscle imbalance [7].
- The condition is attributed to bony and soft tissue abnormalities [9].
- Osteochondroma of the scapula may present with snapping scapula syndrome when it alters scapulothoracic mechanics [6].
- Subscapular elastofibroma is a reactive pseudotumor resulting from mechanical friction of the scapula on the chest wall [86].

### BONY ANATOMY AND MORPHOLOGY

- The scapula is separated from the chest wall by thin gliding fibro-fatty tissue, allowing its smooth excursion over the chest wall [53].
- Anterior angulation of the medial scapula in the axial plane was associated with snapping scapula syndrome [34].
- Patients with a concave-shaped scapula and a positive medial scapula corpus angle may be at risk for snapping scapula syndrome [47].
- The anterior offset of the scapula appeared to be the most important bony parameter to consider during preoperative planning and the evaluation of scapulothoracic space decompression with partial scapulectomy [46].

- The weakest area of the circumference of the biomechanical body of the scapula is the connection of the scapular spine and the medial border of the scapula, known as the spinomedial angle [53].
- The superior angle and the adjacent part of the supraspinous fossa form an appendage that serves as a surface of insertion or origin of muscles but does not transmit compressive forces from the glenoid [53].

## SOFT TISSUE AND NEUROVASCULAR ANATOMY

- Neurologic structures around the scapula vary significantly between the neutral arm position and the chicken-wing position commonly used in the arthroscopic treatment of snapping scapula syndrome [85].
- The scapula is attached to the axial skeleton by the clavicle, specifically by the acromioclavicular and sternoclavicular joints [53].
- The scapula serves for attachment of a number of muscles originating from the axial skeleton that control its motion [53].

## Classification

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- Mauclaire classified scapulothoracic crepitus into three types: froissement (a gentle friction sound thought to be physiologic), frottement (a louder sound with grating, which is usually pathologic), and craquement (a loud snapping sound, which is always pathologic) [26].
- Frottement may suggest a soft-tissue lesion or bursitis, while craquement may suggest an osseous lesion as the source of symptomatic scapulothoracic crepitus [26].
- The snapping scapula syndrome is caused by either osseous lesions or scapulothoracic bursitis [3].
- Snapping scapula is the clinical expression of the scapulothoracic impingement due to mechanical factors and/or muscle imbalance [7].
- The snapping scapula, also called “washboard syndrome,” is a controversial condition attributed to bony and soft tissue abnormalities [9].
- Rib fractures at the posterior angle could cause snapping scapula syndrome [20].

## Clinical Presentation

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- Snapping scapula syndrome is an uncommon condition that is likely underdiagnosed [42].
- The condition can produce severe shoulder pain and dysfunction [24].
- Patients often present with decreased athletic performance and increased pain with overhead activities [42].
- Crepitus is a reported symptom in patients with snapping scapula syndrome [42].
- High clinical suspicion is necessary in patients presenting with medial scapular border tenderness, palpable crepitus, and audible snapping [40].

- Potential factors causing snapping scapula syndrome include bony prominence at the superomedial scapular angle, imbalance of the periscapular muscles, and scapulothoracic bursitis [42].
- Scapulothoracic crepitus is not necessarily a pathologic condition, as it was found in 31% of 100 normal asymptomatic persons [26].
- Scapulothoracic crepitus is considered pathologic if it is associated with pain, winging, or other disorders of the scapulothoracic articulation [26].
- The condition has been referred to by various names, including snapping scapula, washboard syndrome, scapulothoracic syndrome, rolling scapula, grating scapula, and scapulocostal syndrome [26].
- Mauclair classified scapulothoracic crepitus into three types: froissement (gentle friction sound), frottement (louder sound with grating), and craquement (loud snapping sound) [26].
- Scapular noises arise from anatomic changes in the tissue interposed between the scapula and the chest wall and/or an incongruent scapulothoracic articulation [26].
- The air-filled thoracic cavity acts as a resonating chamber that amplifies scapulothoracic crepitus [26].
- A mass composed of alternating strands of fatty and fibrous tissue located at the inferior pole of the scapula is pathognomonic for elastofibroma dorsi [36].
- Scapular osteochondroma is a rarely reported cause of scapular pseudo-winging and should be considered in the differential diagnosis when winging and a mass are present [43].
- The differential diagnosis for causes of snapping scapula includes idiopathic causes, scapulothoracic bursitis, osteochondromas, and elastofibromas [42].
- Four-dimensional computed tomography scans facilitate preoperative planning by defining pathology and assessing the amount and location of scapular bone and soft tissue causing symptoms [18].
- Plain radiographs and CT scans provide detailed information about osseous abnormalities in snapping scapula syndrome [42].
- MRI characterizes bursal and other soft-tissue pathologies in snapping scapula syndrome [42].

## Investigations

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- Symptomatic scapulothoracic crepitus is considered pathologic when associated with pain, winging, or other disorders of the scapulothoracic articulation [26].
- Scapulothoracic crepitus is attributed to anatomic changes in the tissue interposed between the scapula and the chest wall or an incongruent scapulothoracic articulation [26].
- The air-filled thoracic cavity acts as a resonating chamber that amplifies scapulothoracic crepitus noises [26].
- Frottement (a louder sound with grating) usually suggests a soft-tissue lesion or bursitis, while craquement (a loud snapping sound) always suggests an osseous lesion [26].
- Four-dimensional computed tomography (4D CT) scans define pathology well and improve the assessment of the amount and location of scapular bone and soft tissue causing symptoms in snapping scapula syndrome [18].

- Fluoroscopy provides a real-time method for evaluating and documenting abnormal osseous mechanics of the scapulothoracic bursal region [31].
- Anterior angulation of the medial scapula in the axial plane is associated with snapping scapula syndrome [34].
- The anterior offset of the scapula is the most important bony parameter to consider during preoperative planning and evaluation of scapulothoracic space decompression with partial scapulectomy [46].
- Imaging-guided injections provide an alternative means of diagnosis in cases where direct imaging is usually not successful [48].
- Rib fractures at the posterior angle can cause snapping scapula syndrome [20].

## Treatment

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### NON-OPERATIVE MANAGEMENT

- In most cases, nonoperative treatment is curative and includes physical therapy for scapular muscle strengthening and nonsteroidal anti-inflammatory medications [29].
- Nonsurgical management remains the first treatment option, with surgery recommended after 6 months of nonsurgical treatment with no improvement [42].
- Nonoperative management of snapping scapula syndrome in the form of analgesia, physiotherapy, local corticosteroid injection, and/or extracorporeal shockwave therapy should be initiated for 3 to 6 months before considering surgical management [40].
- Strengthening weak periscapular muscle groups combined with simultaneous stretching of contracted muscles and training of antagonistic muscle groups can yield good clinical results [42].
- Physical therapy, injections with local anesthetics and/or steroids, and NSAIDs can be useful in nonsurgical management [42].
- Patients treated nonsurgically achieved results that were not distinguishable from the surgically treated group in a small series with a minimum of 16 years follow-up [24].
- At a minimum of 16 years follow-up, patients treated nonsurgically reported little pain, some crepitus (usually painless), and a consistent ability to return to work [24].

### OPERATIVE MANAGEMENT

- When nonoperative treatment fails, several surgical options exist for snapping scapula syndrome [5].
- Most patients experience residual symptoms after arthroscopic management of snapping scapula syndrome [4].
- For patients who fail conservative management, arthroscopic bursectomy and partial scapulectomy is a reasonable option [23].
- Arthroscopic bursectomy and partial scapulectomy is technically demanding and requires an in-depth understanding of the complex anatomy of the scapulothoracic region [23].

- Improvement in functional outcomes and pain relief are reliably achieved after surgical treatment of snapping scapula syndrome [28].
- Poorer outcomes can be seen in workers' compensation patients as well as those with residual symptomatic shoulder pathology following surgical treatment [28].
- Operative time is shorter without scapuloplasty when performing arthroscopic scapulothoracic bursectomy [30].
- Open surgical treatment for snapping scapula provides durable pain relief [24].
- Patients treated surgically for snapping scapula report little pain, some crepitus (usually painless), and a consistent ability to return to work at a minimum of 16 years follow-up [24].
- At the end of 1 year, all patients in a case series of arthroscopic management for recalcitrant scapulothoracic bursitis had a constant score above 90 and were completely relieved of snapping around the scapula [11].
- Patients in a case series of arthroscopic management for recalcitrant scapulothoracic bursitis had full pain-free movements at the shoulder and scapulothoracic joints at 1 year [11].
- A patient with snapping scapula syndrome remained asymptomatic with full range of motion and no further complaints of pain or snapping at twenty-six months postoperatively [12].
- Snapping and pain were completely gone and the patient was satisfied with the results at 2 years 6 months after operation for abnormal angulation of the superior angle of the scapula [13].
- Arthroscopic access to the scapulothoracic space is simple and reproducible, with bursal tissue clearance optimizing visualization [25].
- Arthroscopic treatment of snapping scapula follows 8 key steps to ensure a safe and effective procedure [10].
- A technique for arthroscopic management of snapping scapula syndrome includes scapulothoracic bursectomy and superomedial partial scapulectomy, which has been refined over nearly two decades of experience [16].
- Most authors have recommended partial scapulectomy or resection of the superomedial angle of the scapula in patients with scapular crepitus and pain caused by bony incongruity [81].
- The decision for and timing of operative management should be individualized for each patient [81].
- Operative options include partial scapulectomy and open versus arthroscopic bursectomy [81].

## Complications

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- Arthroscopic management of snapping scapula syndrome results in most patients experiencing residual symptoms [4].
- Snapping scapula syndrome is difficult to recognize and treat [3].

# Recovery

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## NON-OPERATIVE

- Nonoperative treatment for snapping scapula syndrome includes physical therapy for scapular muscle strengthening and nonsteroidal anti-inflammatory medications [29].
- In most cases, nonoperative treatment is curative [29].

## OPERATIVE OUTCOMES

- Improvement in functional outcomes and pain relief are reliably achieved after surgical treatment [28].
- Poorer outcomes can be seen in workers' compensation patients as well as those with residual symptomatic shoulder pathology [28].
- At the end of 1 year, all the patients had a constant score above 90 and were completely relieved of snapping around the scapula having full pain-free movements at the shoulder and scapulothoracic joints [11].
- The patient remained asymptomatic with full range of motion and no further complaints of pain or snapping at twenty-six months postoperatively [12].
- A year after excision, the patient has not suffered recurrent pain in the left shoulder [90].

## SURGICAL TECHNIQUE AND PLANNING

- Operative time is shorter without scapuloplasty [30].
- The 4D CT scan images defined pathology well in patients with snapping scapula syndrome and improved assessment of the amount and location of the scapular bone and soft tissue causing symptoms [18].

# Key Evidence

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- [L5] Diagnosis and management of snapping scapula syndrome remains challenging despite recent advances. [1] ([10.5435/jaaos-21-04-214](#))
- [L4] Snapping scapula syndrome can be a debilitating disorder. [2] ([10.1016/j.arthro.2012.05.889](#))
- [L5] The snapping scapula syndrome is caused by either osseous lesions or scapulothoracic bursitis and can be difficult to recognize and treat. [3] ([10.1155/2013/635628](#))
- [L1] Arthroscopic management of snapping scapula syndrome yields improvement in pain, crepitus, and range of motion in a majority of patients; however, most patients experience residual symptoms. [4] ([10.1007/s00167-017-4693-5](#))
- [L5] Treatment of patients with snapping scapula syndrome begins with nonoperative methods; when nonoperative treatment fails, several surgical options exist. [5] ([10.1177/0363546504268790](#))
- [Case\_report] Osteochondroma of the scapula is a rare entity that may present with snapping scapula syndrome when it alters scapulothoracic mechanics. [6] ([10.1016/j.otsr.2017.01.019](#))

- [L4] Snapping scapula is the clinical expression of the scapulothoracic impingement due to mechanical factors and/or muscle imbalance. [7] ([10.1016/s1058-2746\(96\)80466-6](#))
- [L4] Arthroscopic scapulothoracic treatment provides significant pain relief and functional improvement for painful snapping scapula symptoms not responding to non-surgical treatment modalities. [8] ([10.2174/1874325001711010785](#))
- [L5] The snapping scapula, also called “washboard syndrome” is a controversial condition attributed to bony and soft tissue abnormalities. [9] ([10.11138/mltj/2013.3.2.080](#))
- [L5] Arthroscopic treatment of snapping scapula follows 8 key steps to ensure a safe and effective procedure. [10] ([10.1016/j.eats.2025.103671](#))
- [L4] At the end of 1 year, all the patients had a constant score above 90 and were completely relieved of snapping around the scapula having full pain-free movements at the shoulder and scapulothoracic joints. [11] ([10.13107/jocr.2025.v15.i02.5290](#))
- [Case\_report] The patient remained asymptomatic with full range of motion and no further complaints of pain or snapping at twenty-six months postoperatively. [12] ([10.2106/00004623-198264060-00020](#))
- [L5] At 2 years 6 months after the operation, snapping and pain were completely gone and the patient was satisfied with the results. [13] ([10.1016/s1058-2746\(03\)00178-2](#))
- [L3] Arthroscopic treatment for snapping scapula syndrome resulted in significant improvement in pain and function with high patient satisfaction at a mean follow-up of 3.4 years. [14] ([10.1177/2325967116s00097](#))
- [L3] Arthroscopic scapuloplasty leads to significant improvement in pain and function in patients with snapping scapula syndrome refractory to conservative treatment. [15] ([10.1016/j.arthro.2020.07.024](#))
- [L5] This Technical Note presents a technique for arthroscopic management of snapping scapula syndrome that includes scapulothoracic bursectomy and superomedial partial scapulectomy, which has been refined over nearly two decades of experience. [16] ([10.1016/j.eats.2022.02.028](#))
- [L5] The editorial commentary notes that the referenced study by Menge et al. concludes that arthroscopic surgery is an effective treatment for snapping scapula syndrome in both primary and revision cases, showing significant improvements in all postoperative outcome scores at a mean of 3.4 years. [17] ([10.1016/j.arthro.2016.11.017](#))
- [L5] The 4D CT scan images defined pathology well in patients with snapping scapula syndrome and improved assessment of the amount and location of the scapular bone and soft tissue causing symptoms. [18] ([10.1016/j.jse.2014.09.020](#))
- [L4] Arthroscopic resection of the superomedial corner of the scapula is a useful technique in patients whose pain and clicking can be clinically localized and who have failed to respond to conservative measures. [19] ([10.1016/s1058-2746\(99\)90056-3](#))
- [L5] It should be noted that rib fractures at the posterior angle could cause snapping scapula syndrome. [20] ([10.1016/s1058-2746\(03\)00055-7](#))
- [Paper] For those patients who fail conservative management, arthroscopic bursectomy and partial scapulectomy is a reasonable option, but is technically demanding and requires an in-depth understanding of the complex anatomy of the scapulothoracic region. [23] ([10.1016/j.csm.2014.06.003](#))

- [L3] [24] ([10.1007/s11999-015-4614-1](#))
- [Paper] Arthroscopic access to the scapulothoracic space is simple and reproducible, with bursal tissue clearance optimizing visualization. [25] ([10.1016/j.eats.2015.07.002](#))
- [L4] [26] ([10.5435/00124635-199809000-00001](#))
- [L4] Improvement in functional outcomes and pain relief are reliably achieved after surgical treatment, although poorer outcomes can be seen in workers' compensation patients as well as those with residual symptomatic shoulder pathology. [28] ([10.1177/2325967113505739](#))
- [L5] In most cases, nonoperative treatment is curative and includes physical therapy for scapular muscle strengthening and nonsteroidal anti-inflammatory medications. [29] ([10.1016/j.arthro.2008.12.022](#))
- [L3] Operative time is shorter without scapulothoracic space decompression. [30] ([10.1016/j.jse.2023.03.020](#))
- [L5] Fluoroscopy provides a realtime method of evaluating and documenting abnormal osseous mechanics of the scapulothoracic bursal region. [31] ([10.1007/s11420-007-9047-2](#))
- [L3] Anterior angulation of the medial scapula in the axial plane was associated with SSS. [34] ([10.1016/j.jse.2014.12.034](#))
- [L4] 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. [35] ([10.1007/s00590-012-1154-1](#))
- [L4] A mass composed of alternating strands of fatty and fibrous tissue is pathognomonic if it is located at the inferior pole of the scapula. [36] ([10.1016/j.jbspin.2004.04.006](#))
- [L4] [40] ([10.1177/19417381211029211](#))
- [Case\_report] Scapular osteochondroma is a rarely reported cause of scapular pseudo-winging, and should be considered in the differential diagnosis when winging and a mass are present. [43] ([10.1007/s11552-014-9659-1](#))
- [L5] The anterior offset of the scapula appeared to be the most important bony parameter to consider during preoperative planning and the evaluation of scapulothoracic space decompression with partial scapulectomy. [46] ([10.1177/0363546516687755](#))
- [L3] Those patients with a concave-shaped scapula and a positive MSCA may be at risk for SSS. [47] ([10.1177/2325967114s00063](#))
- [L4] [48] ([10.2214/ajr.181.5.1811232](#))
- [L5] [81] ([10.1177/1941738109338359](#))
- [L5] Neurologic structures around the scapula vary significantly between the neutral arm position and the chicken-wing position commonly used in the arthroscopic treatment of SSS. [85] ([10.1016/j.jse.2022.03.029](#))
- [L4] Subscapular elastofibroma is a reactive pseudotumor resulting from mechanical friction of the scapula on the chest wall. [86] ([10.1016/s1058-2746\(05\)80008-4](#))
- [L5] A year after excision, the patient has not suffered recurrent pain in the left shoulder. [90] ([10.1016/1058-2746\(93\)90078-u](#))

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