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CLINICAL UPDATES

Assessment and management of shoulder dislocation

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What you need to know

- A traumatic first time anterior shoulder dislocation shows a peak incidence in men aged 16-20 and in women aged 61-70
- Refer patients with suspected dislocation to emergency services for reduction
- Risk of experiencing recurrent dislocation is greater in patients age ≤ 40 , in men, and in people with hyperlaxity
- Immobilising the shoulder for one week is often recommended to reduce pain and prevent recurrence; however, the evidence for immobilisation duration is uncertain
- Young, active patients and those who participate in sports are more likely to benefit from operative treatment in contrast to older patients (without associated injuries) or patients with a low activity level, where conservative therapy may be sufficient

Shoulder dislocations are painful and have an impact on activities of daily living and participation in sports. Most shoulder dislocations (>95%) occur in the anterior direction and are usually the result of trauma.¹⁻³ Optimal management can prevent recurrent dislocations and reduce social costs.⁴⁻⁶ Patients with first time dislocations often receive insufficient information to make a decision about their management.⁷ Shared decision making must take into consideration the patient's preferences for surgery or physical therapy, their expectations, and the likelihood of recurrence.⁶ In this clinical update we present an initial approach for primary care and emergency healthcare providers to assess and manage patients with a traumatic anterior shoulder dislocation.

Who experiences a shoulder dislocation?

More than 70% of shoulder dislocations occur in men.¹⁻³ In a cohort study of 16 763 patients who experienced a first time anterior dislocation in the UK, peak incidence was in men aged 16-20 (80.5 per 100 000 person years) and in women aged 61-70 (28.6 per 100 000 person years).³ These peak incidences are similar in other Western countries, such as Canada, the US, and Norway.^{2,3}

In young patients, shoulder dislocations most often occur during participation in contact and overhead sports, such as rugby, football, and baseball.^{1,2} Shoulder dislocations in older patients are most often caused by a fall at home.² The cause for the peak incidence in older women remains unclear.^{1,3}

Posterior shoulder dislocation is less common, with an incidence of 1.1 per 100 000 person years, and approximately one third of dislocations occur following an atraumatic event, such as a seizure.⁸ Inferior shoulder dislocations (*luxatio erecta*) are rare and have only been described in case reports or small case series.

How do patients present?

Patients present with considerable pain and impaired motion following trauma involving the shoulder. The injured arm is slightly abducted and held by the other arm (*fig 1*), while bending forwards. A fall on the outstretched arm or a direct blow to the shoulder is the most common injury reported in a first time anterior dislocation, but any trauma to the shoulder can cause dislocation.^{2,9,10}

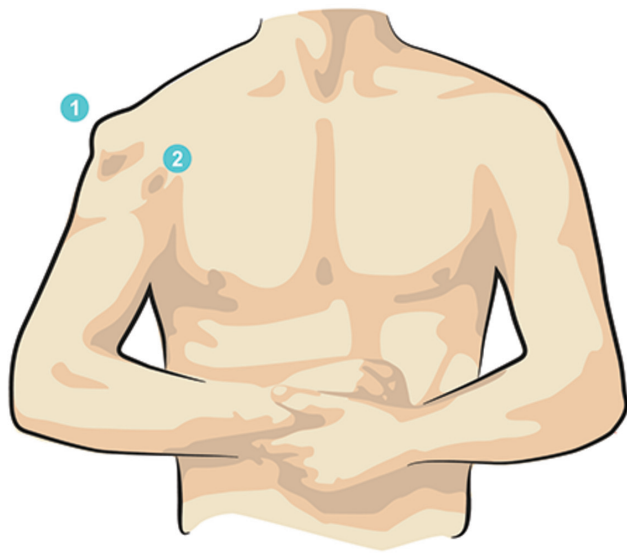


Fig 1 | A prominent acromion (1, 3, 4) and a palpable humeral head (2) can be observed on the injured side, as the humeral head has shifted frontwards and downwards (anteroinferior). Images 1 and 2 reproduced with permission from TH Staal; images 3 and 4 were taken by the authors at the emergency department of the Amsterdam UMC

How is it diagnosed?

The mechanism of trauma and symptoms provides important diagnostic clues.

On examination, a prominent acromion and asymmetry of the shoulder contour are seen on the injured side in anterior dislocation, as the humeral head has shifted front and downwards (anteroinferior, [fig 1](#)).¹¹ In a posterior dislocation, the humeral head is not palpable anteriorly ([fig 1](#)). The impalpable humeral head and

mechanism of injury can be diagnostic clues for a posterior dislocation.

In patients with suspected dislocation, request an anteroposterior and scapular 'Y' radiograph to determine the direction of the dislocation, confirm the diagnosis, and show possible fractures ([fig 2](#)).^{11 12} The Y radiograph uses a sagittal view where the scapula is shaped like a Y ([fig 2](#)). It can distinguish an anterior from a posterior or inferior dislocation. Fractures of greater tuberosity can be detected with high sensitivity (94%) and specificity (95%) using radiographs ([fig 2](#)).¹³

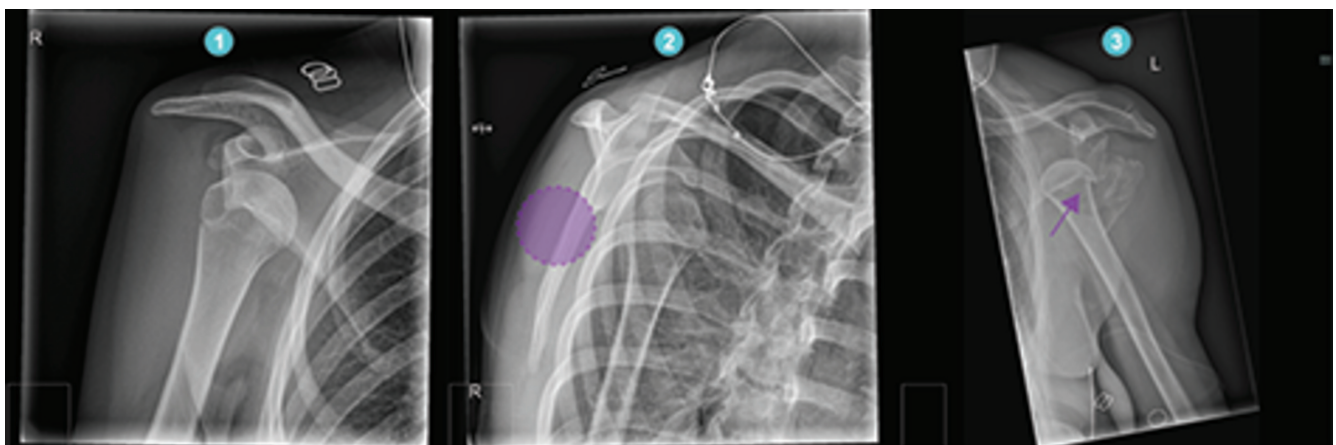


Fig 2 | Anteroposterior radiograph (1 and 3) and a scapular 'Y' radiograph (2). (1) The humeral head is positioned in front of the glenoid, which confirms a dislocation. (2) Shows a scapular 'Y' view that can help to distinguish an anterior from a posterior dislocation. The dotted circle shows where the humeral head would have to be positioned to confirm a posterior dislocation. (3) Shows a confirmed shoulder dislocation with a greater tuberosity fracture. Radiographs reproduced from the database of the Diaconessenhuis by the authors

What complications are associated with shoulder dislocation?

Neurological deficits, greater tuberosity fractures, and rotator cuff tears can accompany shoulder dislocation.^{12 14} Vascular damage is very rare. Fourteen per cent of traumatic anterior dislocations were accompanied by a neurological deficit, 16% by a greater tuberosity fracture, and 10% by a rotator cuff tear in a prospective trauma database study (3633 patients).¹⁴ The risk of greater tuberosity fractures and rotator cuff lesions increased with age and was most common in patients over 40.¹⁴ First time dislocation and high energy trauma (eg, a fall from height) increase the likelihood of associated

fractures.^{11 15} Rotator cuff tears can be difficult to diagnose clinically. Persistent pain and inability to regain function following physiotherapy can result from a rotator cuff tear.

Assess for damage to neurovascular structures.¹² Check radial pulse and capillary refill. Damage to motor neurons can be quickly assessed by asking the patient to extend the fingers (radial nerve), spread the fingers (ulnar nerve), and oppose the thumb (median nerve).¹⁶ Damage to the axillary nerve is characterised by shoulder pain, loss of sensibility on the lateral side of the upper arm (fig 3), and weakness of the deltoid muscle (abduction).¹⁷ Loss of sensibility is often resolved after reduction.

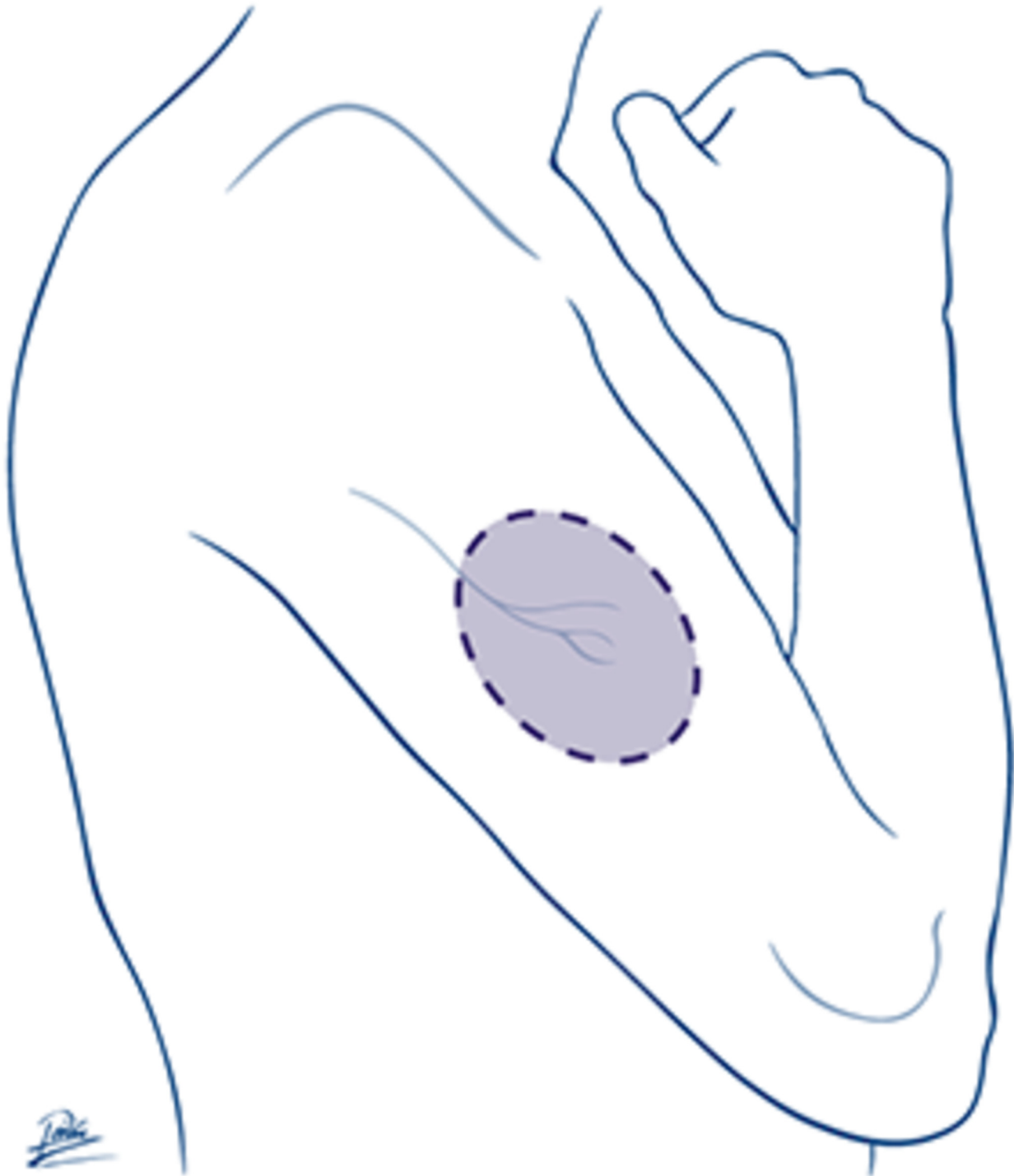


Fig 3 | Sensibility of the lateral side of the upper arm can be assessed for potential damage to the axillary nerve. Image with permission from PR Zwanenburg

The risk of nerve injuries increases with age, associated fractures, and haematoma.¹⁸ Most patients recover spontaneously within one year and regain muscle strength and sensation, but range of motion may be slightly limited in the injured shoulder.¹⁷ Less than 1% of patients have persistent brachial plexus and peripheral nerve

injuries beyond one year, according to a retrospective multicentre study (15 739 patients).¹⁹

What is initial management?

Depending on the mechanism of injury, follow local protocols for the initial assessment and management of trauma, such as Advanced Trauma Life Support.

Adequate analgesia and relaxation is important, and most emergency departments will have procedural sedation and analgesia protocols for patients with shoulder dislocation.

Guidelines from the British Orthopaedic Association recommend referring patients with a first time dislocation to the emergency department^{11 12 16} for reduction. Immediate reduction in a primary care setting may also be considered for patients who are young (<40 years) with a history of frequent dislocations subsequent to minimal trauma and without suspicion of fractures or neurovascular damage.¹⁶ No trials are documented on shoulder reduction in primary care settings. Occasionally patients with recurrent dislocations may be able to reduce the shoulder themselves, and therefore do not require referral if they have no complications.^{11 16}

Reduction

Most techniques for shoulder reduction show a high success rate. No consensus exists regarding the most appropriate method.²⁰ Frequently, more than one technique might be performed for a successful reduction. Hippocratic and Kocher methods are based on traction and leverage.²⁰ Biomechanical techniques—such as scapular manipulation, “Fast, Reliable, and Safe” (FARES), and Cunningham—focus on muscle relaxation. The rotator cuff muscles are strained following a dislocation, and relaxing the muscles allows the humeral head to return to its original position. We recommend

these techniques for shoulder reduction (table 2, supplementary files).

Scapular manipulation and FARES techniques were most successful in reducing the shoulder, with success rates of 97% and 92%, respectively, in a systematic review (1377 patients, nine randomised controlled trials and four comparative studies) on closed reduction techniques performed at emergency departments. These techniques were less painful (1.47 and 1.59 on a visual analogue scale of 1 to 10) compared with traction and/or leverage techniques (visual analogue scale >4).^{20–24} Small sample sizes and possible bias in studies mean, however, that high quality evidence assessing the most successful and least painful technique is lacking.^{16 20 21 25}

Rarely, neurovascular complications and iatrogenic fractures have been reported following reduction.^{26–28} Assess and document damage to neurovascular structures before and after reduction. Request a radiograph after reduction to determine if the reduction was successful and if it caused any fractures.^{11 12}

Immobilise the shoulder

Standard practice is to immobilise the shoulder following closed reduction to reduce pain and allow healing of the soft tissues or fractures (fig 4). Optimum duration and type of immobilisation are uncertain, and it is unclear if immobilisation prevents recurrence. A systematic review found that immobilisation for more than one week was not beneficial in preventing recurrence in patients younger than 30.³⁰ About one third of patients experience a recurrent dislocation whether immobilisation is in internal or external rotation,²⁹ as in a Cochrane review (seven trials, 704 patients) with duration of immobilisation of three or four weeks.³⁰



Fig 4 | Position of the arm in immobilisation in internal rotation (1) and immobilisation in external rotation (2). Photographs taken at the emergency department of the Diaconessenhuis by the authors

What factors increase the risk of recurrence?

Up to 40% of patients experience recurrence (defined as a complete dislocation or subluxation) ≥ 12 months following a first time dislocation, according to a systematic review (10 cohort studies, 1324 patients).¹⁰ Young patients (≤ 40 years) are 13 times more likely, men are three times more likely, and patients with hyperlaxity are three times more likely to experience recurrence (supplementary files, table 1). Patients with a greater tuberosity fracture were less likely to experience recurrence.¹⁰ More than 85% of recurrent dislocations were experienced within two years in a prospective cohort study (252 patients aged <35 years).³²

What does long term management involve?

Offer referral to an orthopaedic specialist for further management as in criteria listed in box 1.

Box 1: Who to refer to an orthopaedic specialist

- Patients who experience a first time dislocation who may wish to consider both surgical and non-surgical options
- Athletes and active patients
- Patients with suspected neurovascular injuries
- Patients with a greater tuberosity fracture

- Where conservative treatment has been unsuccessful and the patient experiences recurrent dislocations
- Patients >40 with persistent pain who are unable to regain function (possible rotator cuff tear)

Conservative management or surgery

Conservative management comprises physical therapy with scapula and rotator cuff training.^{31 33} A prospective cohort study with 25 years follow-up (255 patients) showed a recurrence rate of 60% with physical therapy.³¹

Surgery comprises arthroscopic repair of the capsule and labrum complex with/without tenomyodesis or a more invasive procedure in which a bone graft is added to the glenoid (bone augmentation).^{34 35} Recurrence is lower, but surgery can have complications. A systematic review (56 studies, 4336 patients) showed a pooled recurrence rate of 16% (2693 patients) following the labral repair, 9% (219 patients) following the labral repair with remplissage (tenomyodesis of the infraspinatus tendon), and 6% (905 patients) following the bone augmentation procedure. These recurrence rates are primarily based on patients receiving operative treatment following recurrent dislocations.³⁵ Complications occurred in 5% of patients with bone augmentation compared with <2% for labral repair. Hardware failure, non-union/fracture of the graft, haematoma, and temporary nerve injury are common complications following bone augmentation procedures, and shoulder stiffness is the most common complication following labral repairs.³⁵

Shared decision making

Weighing the benefits and risks of physical therapy and operative treatment following a first time dislocation can be challenging for patients and healthcare professionals. Participation in contact sports, such as rugby, football, basketball, and hockey increases the risk of recurrence. Operative treatment may be preferred in these patients and in younger patients (<40 years) to reduce recurrence.^{36 37} A systematic review (17 studies, 642 patients) evaluating return to sport in athletes aged ≤18 years showed that 41% return to sport (return to pre-injury level or higher) following physical therapy and 95% return to sport following operative treatment.³⁸

Patients over 40 are less likely to experience recurrence and may prefer physical therapy.^{39 40} High quality evidence that determines risk factors or evaluates benefits of operative treatment in older patients is lacking. The degree of post-dislocation osteoarthritis is increased compared with the contralateral shoulder, but it is unclear if surgery may reduce this compared with physical therapy.⁴¹

Patient perspective

I experienced my first shoulder dislocation in 2015. This was a painful and scary experience. The only thing I could think was: "this pain must stop!" I was brought to the emergency department and received medications to reduce the pain and help me relax. The reduction was successful after the first attempt and decreased the pain considerably. After a week of immobilisation, I met an orthopaedic surgeon and we decided on physiotherapy. I started to exercise and participate in kickboxing gradually. Unfortunately, I experienced a dislocation again three years later. This was much worse, and several attempts were needed to reduce my shoulder. Physiotherapy did not help this time. My shoulder felt unstable. I decided to go for surgery to prevent recurrence and so that I could return to a high level of activity. I am satisfied with the surgery. I have since experienced dislocation of my other shoulder as well. My experience showed me that it is important for doctors to discuss the treatment options and reach a shared decision with the patient based on activity level and risk of recurrence.

Sources and selection criteria

We searched Pubmed/Medline, Embase, Web of Science, and the Cochrane databases from 1990 to April 2020 using the terms "first/initial/primary/acute", "shoulder dislocation", "surgery/operative", "conservative/non-operative", and "sham surgery". We included systematic reviews, randomised trials, or comparative studies reporting outcomes following operative treatment for a first time dislocation versus conservative treatment or treatment for recurrent dislocations (recurrence). We also searched Pubmed/Medline and Cochrane databases using the terms "first/initial/primary/acute", "shoulder dislocation", "risk", "diagnosis", "return to sport", and "closed reduction" to find systematic reviews and relevant studies on first time dislocations. We referred to the National Institute for Health and Care Excellence, British Orthopaedic Association, Dutch Federation of Medical Specialists, and National Center for Complementary and Integrative Health databases for guidelines on traumatic first time anterior shoulder dislocations.

Questions for future research

- What techniques for closed reduction following shoulder dislocation are most effective and safe?
- What is optimal physiotherapy for conservative management of shoulder dislocation?
- What is the influence of no immobilisation on short term pain reduction and risk of recurrent dislocations (recurrence)?
- How can machine learning help develop tools to predict recurrence?
- What prognostic factors facilitate time to return to sport?
- What is the risk of recurrence and the incidence of complications with a shoulder dislocation in women over 50?

Additional educational resources for healthcare professionals

The guideline of the British Orthopaedic Association (BOA): <https://www.boa.ac.uk/uploads/assets/deaeadf1-a971-4544-a6f15do5c3c5cf43/traumatic-anterior-instability.pdf> (free)

- Operative techniques to treat an unstable shoulder: <https://www.orthobullets.com/shoulder-and-elbow/3050/traumatic-anterior-shoulder-instability-tubs> (free)
- Information about shoulder dislocations and associated lesions: www.shoulderdoc.co.uk (free)
- Explanation of radiograph assessment: <https://radiopaedia.org/articles/shoulder-dislocation> (free)
- Video of scapula manipulation closed reduction technique: <https://www.youtube.com/watch?v=Cig7XRH8cZs> (free)
- Video of the FARES closed reduction technique: <https://www.youtube.com/watch?v=RCDosZREYlg> (free)
- Video of the Cunningham closed reduction technique: <https://dislocation.com.au/cunningham> (free); <https://www.youtube.com/watch?v=SIAXsg2yMoM> (free)
- Beighton criteria and how to assess hyperlaxity: <https://www.ehlers-danlos.com/assessing-joint-hypermobility/> (free)

Information resources for patients

- Explanation of shoulder dislocations and management: <https://www.nhs.uk/conditions/dislocated-shoulder/> (free); <https://www.shoulderdoc.co.uk/article/50> (free)

Education into practice

- When do you suspect an anterior shoulder dislocation?

- How would you discuss management options with a patient who has recurrent dislocation?
- When would you refer a patient with anterior shoulder dislocation to a shoulder specialist?

How patients were involved in the creation of this article

Julia MJ van der Zande was invited as patient co-author. She supported us in writing the article and shared her experience of a shoulder dislocation and considerations regarding treatment from a patient perspective. Four patients read a draft of this paper and suggested discussing associated complications. In addition, a patient reviewed this paper for *The BMJ* and suggested discussing the conservative and surgical treatment options. We have attempted to cover these now, though the paper mainly focuses on initial management.

We are grateful for these inputs.

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- DeFroda SF, Donnelly JC, Mulcahey MK, Perez L, Owens BD. Shoulder instability in women compared with men: epidemiology, pathophysiology, and special considerations. *JBJS Rev* 2019;7:e10. doi: 10.2106/JBJS.RVW.19.00007 pmid: 31567718
- Zacchilli MA, Owens BD. Epidemiology of shoulder dislocations presenting to emergency departments in the United States. *J Bone Joint Surg Am* 2010;92:542-9. doi: 10.2106/JBJS.I.00450 pmid: 20194311
- Shah A, Judge A, Delmestri A, et al. Incidence of shoulder dislocations in the UK, 1995-2015: a population-based cohort study. *BMJ Open* 2017;7:e016112. doi: 10.1136/bmjopen-2017-016112 pmid: 29138197
- van der Linde JA, Bosmans JE, Ter Meulen DP, et al. Direct and indirect costs associated with nonoperative treatment for shoulder instability: an observational study in 132 patients. *Shoulder Elbow* 2019;11:265-74. doi: 10.1177/1758573218773543 pmid: 31316587
- Crall TS, Bishop JA, Guttman D, Kocher M, Bozic K, Lubowitz JH. Cost-effectiveness analysis of primary arthroscopic stabilization versus nonoperative treatment for first-time anterior glenohumeral dislocations. *Arthroscopy* 2012;28:1755-65. doi: 10.1016/j.arthro.2012.05.885 pmid: 23040837
- Hurley ET, Manjunath AK, Bloom DA, et al. Arthroscopic Bankart repair versus conservative management for first-time traumatic anterior shoulder instability—a systematic review and meta-analysis. *Arthroscopy* 2020;36:2526-32. doi: 10.1016/j.arthro.2020.04.046 pmid: 32389771
- Hutrya CA, Streufert B, Politzer CS, et al. Assessing the effectiveness of evidence-based medicine in practice: a case study of first-time anterior shoulder dislocations. *J Bone Joint Surg Am* 2019;101:e6. doi: 10.2106/JBJS.17.01588 pmid: 30653051
- Robinson CM, Seah M, Akhtar MA. The epidemiology, risk of recurrence, and functional outcome after an acute traumatic posterior dislocation of the shoulder. *J Bone Joint Surg Am* 2011;93:1605-13. doi: 10.2106/JBJS.J.00973 pmid: 21915575
- Memon M, Kay J, Cadet ER, Shahsavari S, Simunovic N, Ayeni OR. Return to sport following arthroscopic Bankart repair: a systematic review. *J Shoulder Elbow Surg* 2018;27:1342-7. doi: 10.1016/j.jse.2018.02.044 pmid: 29622461
- Olds M, Ellis R, Donaldson K, Parmar P, Kersten P. Risk factors which predispose first-time traumatic anterior shoulder dislocations to recurrent instability in adults: a systematic review and meta-analysis. *Br J Sports Med* 2015;49:913-22. doi: 10.1136/bjsports-2014-094342 pmid: 25900943
- Dala-Ali B, Penna M, McConnell J, Vanhegan I, Cobiella C. Management of acute anterior shoulder dislocation. *Br J Sports Med* 2014;48:1209-15. doi: 10.1136/bjsports-2012-091300 pmid: 22821719
- Brownson P, Donaldson O, Fox M, et al. BESS/BOA Patient Care Pathways: Traumatic anterior shoulder instability. *Shoulder Elbow* 2015;7:214-26. doi: 10.1177/1758573215585656 pmid: 27582981
- Auffarth A, Mayer M, Kofler B, et al. The interobserver reliability in diagnosing osseous lesions after first-time anterior shoulder dislocation comparing plain radiographs with computed tomography scans. *J Shoulder Elbow Surg* 2013;22:1507-13. doi: 10.1016/j.jse.2013.04.020 pmid: 23790679
- Robinson CM, Shur N, Sharpe T, Ray A, Murray IR. Injuries associated with traumatic anterior glenohumeral dislocations. *J Bone Joint Surg Am* 2012;94:18-26. doi: 10.2106/JBJS.J.01795 pmid: 22218378
- Emond M, Le Sage N, Lavoie A, Rochette L. Clinical factors predicting fractures associated with an anterior shoulder dislocation. *Acad Emerg Med* 2004;11:853-8. doi: 10.1197/j.aem.2004.03.009 pmid: 15289192
- Norte GE, West A, Gnacinski M, van der Meijden OA, Millet PJ. On-field management of the acute anterior glenohumeral dislocation. *Phys Sportsmed* 2011;39:151-62. doi: 10.3810/psm.2011.09.1931 pmid: 22030951
- Duralde XA. Neurologic injuries in the athlete's shoulder. *J Athl Train* 2000;35:316-28. pmid: 16558645
- Visser CP, Coene LN, Brand R, Tavy DL. The incidence of nerve injury in anterior dislocation of the shoulder and its influence on functional recovery. A prospective clinical and EMG study. *J Bone Joint Surg Br* 1999;81:679-85. doi: 10.1302/0301-620X.81B4.0810679 pmid: 10463745
- Tiefenboeck TM, Zeilinger J, Komjati M, Fialka C, Boesmueller S. Incidence, diagnostics and treatment algorithm of nerve lesions after traumatic shoulder dislocations: a retrospective multicenter study. *Arch Orthop Trauma Surg* 2020;140:1175-80. doi: 10.1007/s00402-020-03348-z pmid: 31980880
- Alkaduhimi H, van der Linde JA, Willigenburg NW, van Deurzen DFP, van den Bekerom MPJ. A systematic comparison of the closed shoulder reduction techniques. *Arch Orthop Trauma Surg* 2017;137:589-99. doi: 10.1007/s00402-017-2648-4 pmid: 28251280
- Baden DN, Roetman MH, Boeije T, et al. Biomechanical reposition techniques in anterior shoulder dislocation: a randomised multicentre clinical trial- the BRASD-trial protocol. *BMJ Open* 2017;7:e013676. doi: 10.1136/bmjopen-2016-013676 pmid: 28729305
- Sayegh FE, Kenanidis EI, Papavasiliou KA, Potoupnis ME, Kirkos JM, Kapetanios GA. Reduction of acute anterior dislocations: a prospective randomized study comparing a new technique with the Hippocratic and Kocher methods. *J Bone Joint Surg Am* 2009;91:2775-82. doi: 10.2106/JBJS.H.01434 pmid: 19952238
- McNamara RM. Reduction of anterior shoulder dislocations by scapular manipulation. *Ann Emerg Med* 1993;22:1140-4. doi: 10.1016/S0196-0644(05)80979-5 pmid: 8517564
- Cunningham NJ. Techniques for reduction of anteroinferior shoulder dislocation. *Emerg Med Australas* 2005;17:463-71. pmid: 16302939
- Schuur D, Baden D, Roetman M, Boeije T, Burg M, Mullaart-Jansen N. Which factors influence the ED length-of-stay after anterior shoulder dislocations: a retrospective chart review in 716 cases. *BMC Emerg Med* 2020;20:41. doi: 10.1186/s12873-020-00336-9 pmid: 32434475
- Riebel GD, McCabe JB. Anterior shoulder dislocation: a review of reduction techniques. *Am J Emerg Med* 1991;9:180-8. doi: 10.1016/0735-6757(91)90187-0 pmid: 1994950
- Regauer M, Polzer H, Mutschler W. Neurovascular complications due to the Hippocrates method for reducing anterior shoulder dislocations. *World J Orthop* 2014;5:57-61. doi: 10.5312/wjo.v5i1.57 pmid: 24649415
- Atoun E, Narvani A, Even T, et al. Management of first-time dislocations of the shoulder in patients older than 40 years: the prevalence of iatrogenic fracture. *J Orthop Trauma* 2013;27:190-3. doi: 10.1097/BOT.0b013e3182657618 pmid: 22810551
- Braun C, McRobert CJ. Conservative management following closed reduction of traumatic anterior dislocation of the shoulder. *Cochrane Database Syst Rev* 2019;5:CD004962. doi: 10.1002/14651858.CD004962.pub4 pmid: 31074847
- Paterson WH, Throckmorton TW, Koester M, Azar FM, Kuhn JE. Position and duration of immobilization after primary anterior shoulder dislocation: a systematic review and meta-analysis of the literature. *J Bone Joint Surg Am* 2010;92:2924-33. doi: 10.2106/JBJS.J.00631 pmid: 21159993
- Hovelius L, Olofsson A, Sandström B, et al. Nonoperative treatment of primary anterior shoulder dislocation in patients forty years of age and younger: a prospective twenty-five-year follow-up. *J Bone Joint Surg Am* 2008;90:945-52. doi: 10.2106/JBJS.G.00070 pmid: 18451384
- Robinson CM, Howes J, Murdoch H, Will E, Graham C. Functional outcome and risk of recurrent instability after primary traumatic anterior shoulder dislocation in young patients. *J Bone Joint Surg Am* 2006;88:2326-36. doi: 10.2106/00004623-200611000-00002 pmid: 17079387
- Cools AM, Borms D, Castelein B, Vanderstucken F, Johansson FR. Evidence-based rehabilitation of athletes with glenohumeral instability. *Knee Surg Sports Traumatol Arthrosc* 2016;24:382-9. doi: 10.1007/s00167-015-3940-x pmid: 26704789
- Alkaduhimi H, Verweij LPE, Willigenburg NW, van Deurzen DFP, van den Bekerom MPJ. Remplissage with Bankart repair in anterior shoulder instability: a systematic review of the clinical and cadaveric literature. *Arthroscopy* 2019;35:1257-66. doi: 10.1016/j.arthro.2018.10.117 pmid: 30954117
- Williams HLM, Evans JP, Furness ND, Smith CD. It's not all about redislocation: a systematic review of complications after anterior shoulder stabilization surgery. *Am J Sports Med* 2019;47:3277-83. doi: 10.1177/0363546518810711 pmid: 30525905
- Yapp LZ, Nicholson JA, Robinson CM. Primary arthroscopic stabilization for a first-time anterior dislocation of the shoulder: long-term follow-up of a randomized, double-blinded trial. *J Bone Joint Surg Am* 2020;102:460-7. doi: 10.2106/JBJS.19.00858 pmid: 31895236
- Dickens JF, Rue JP, Cameron KL, et al. Successful return to sport after arthroscopic shoulder stabilization versus nonoperative management in contact athletes with anterior shoulder instability: a prospective multicenter Study. *Am J Sports Med* 2017;45:2540-6. doi: 10.1177/0363546517712505 pmid: 28657778
- Zaremski JL, Galloza J, Sepulveda F, Vasilopoulos T, Micheo W, Herman DC. Recurrence and return to play after shoulder instability events in young and adolescent athletes: a systematic review and meta-analysis. *Br J Sports Med* 2017;51:177-84. doi: 10.1136/bjsports-2016-096895 pmid: 27834676
- Gombera MM, Sekiya JK. Rotator cuff tear and glenohumeral instability: a systematic review. *Clin Orthop Relat Res* 2014;472:2448-56. doi: 10.1007/s11999-013-3290-2 pmid: 24043432

- 40 Shin SJ, Yun YH, Kim DJ, Yoo JD. Treatment of traumatic anterior shoulder dislocation in patients older than 60 years. *Am J Sports Med* 2012;40:822-7. doi: 10.1177/0363546511434522 pmid: 22287643
- 41 Verweij LPE, Pruijssen EC, Kerkhoffs GMMJ, et al. Treatment type may influence degree of post-dislocation shoulder osteoarthritis: a systematic review and meta-analysis. *Knee Surg Sports Traumatol Arthrosc* 2020. doi: 10.1007/s00167-020-06263-3. pmid: 32936334