



The Bankart repair: past, present, and future

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Arthur Sidney Blundell Bankart was a London-based orthopedic surgeon who discovered the essential lesion in recurrent anterior shoulder instability in 1923. He pioneered a technique, the Bankart repair, to re-establish stability to the glenohumeral joint, without sacrificing native joint motion. In this article, the original Bankart repair is compared to the modern arthroscopic Bankart repair, accompanied by a surgical video of Blundell Bankart performing the Bankart repair in 1951, shortly before his death. Bankart's original description included an open repair with a coracoid osteotomy and subscapularis tenotomy and repair. The history of the technique, its utility in present day, and the future of the Bankart repair are discussed.

Level of evidence: Narrative Review

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History of shoulder instability

Shoulder dislocations have been noted since Hippocrates of Kos in the fifth century BCE.¹ In the published scientific literature, the earliest accounts date back to the early 1800s. During this time, eminent surgeons described anatomic dissections of chronic locked dislocations, described experiences with various methods of reduction, and noted the various types of shoulder dislocations observed.^{7,16,17,21} Notable remarks came from Sir Astley Cooper, who

described 4 types of shoulder dislocation, and expressed a preference for the heel-in-axilla method of closed reduction (Hippocratic method).²⁶ John Lynn Thomas reported on a series of 30 patients with acute traumatic anterior shoulder dislocations in 1893.³⁵ He used a modification of the reduction method described by Professor Kocher, first presented at the International Medical Congress in 1881. Thomas reported success at the first attempt in 24 cases. In the 6 failures, 5 were eventually reduced, either by repeat attempt using a different method or by using chloroform anesthesia.³⁵

Sir Joseph Lister described the earliest attempts at open reduction to treat chronic bilateral anterior shoulder dislocations in 2 patients.²⁶ An operative approach was preferred after Sir Lister suffered a fatal complication attempting to reduce a chronically dislocated shoulder by closed means, resulting in axillary artery avulsion and exsanguination.

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The 2 patients treated operatively underwent different procedures. The first underwent a staged open reduction with complete tenotomy of the entire rotator cuff, in order to reduce the humeral head. As expected, although the patient had a reduced glenohumeral joint, function was limited to below the horizontal level. In the second case, Sir Lister opted to osteotomize the humeral head while leaving the tuberosities in place, in order to reduce the joint. This technique yielded a similar result to the first regarding function, but was deemed a “great success” as the patient was able to return to his livelihood of farming a few months after surgery. An article in 1907 made reference to the common methods of reduction of that era.¹¹ It also recommended avoiding closed reduction attempts in favor of open reduction, if the dislocation was more than 1 month old. This article also noted that “when a shoulder has been dislocated two or three times, it comes out at the slightest provocation.”¹¹

At the time when Bankart first described labral detachment and his technique for repair, many surgical techniques were described to treat the recurrently unstable shoulder. He noted that these techniques did not address what he believed to be the primary pathology. At the time, the Clairmont and Ehrlich operation, the Nicola operation, and the Henderson sling operation were commonly used to treat recurrent instability. The Clairmont and Ehrlich operation involved creating an anteroinferior sling using the posterior fifth of deltoid muscle, transposing it to the coracoid process. The Nicola operation was first described by Tuffic Nicola in 1929. This technique involved creating a tunnel through the humeral head, exiting in the bicipital groove and passing the long head of biceps through this tunnel, creating a ligament thought to be similar to ligamentum teres of the hip joint.³⁷ The Nicola procedure soon fell out of favor owing to poor results. Melvin Henderson described his technique in 1921, using >50% of the peroneus longus tendon passed through drill holes in the acromion and humeral head to act as a sling, preventing anteroinferior dislocation.¹⁹ The Putti Platt procedure was described independently by Sir Harry Platt (Manchester, UK) and Vittorio Putti (Bologna, Italy) in 1925 and 1923, respectively.²⁷ The procedures became known as the Putti-Platt operation, which involved shortening the subscapularis and anterior capsule by double breasting them over one another. Sir Harry Platt stated that he developed this technique after finding no Bankart lesion present in some cases of recurrent shoulder instability.²⁷

Arthur Sidney Blundell Bankart

Arthur Bankart was born in 1879 and studied medicine at Trinity College, Cambridge. He qualified in 1906 and became a Fellow of the Royal College of Surgeons of England in 1909. Bankart, who preferred to be called by one of his middle names, Blundell, worked as a consulting

surgeon at various hospitals in London (UK), including the Middlesex Hospital, the Royal National Orthopaedic Hospital, and Mount Vernon Hospital. In 1913, he was appointed as the first honorary secretary of the newly formed subsection of orthopedic surgery in the Royal Society of Medicine. He was later elected President of the Royal Society of Medicine in 1935. He was a founder member of the British Orthopaedic Association, and its president from 1932-1933. Blundell Bankart was a founder member of the Société Internationale de Chirurgie Orthopédique et de Traumatologie, and a honorary member of the Société Française d'Orthopédie. He passed away suddenly on April 8, 1951, aged 71 years.^{29,30}

The original Bankart repair technique

In 1923, Bankart described the anatomic lesion he believed to be the primary cause of recurrent anterior instability in the *British Medical Journal*.² At that time, although recurrent glenohumeral joint instability was a recognized phenomenon, associated with athletes and epileptics, Bankart believed that the surgical treatments of his time did not reproduce a stable shoulder, but rather sought to limit normal shoulder movements by overtightening the capsule to limit abduction. In this seminal article, he wrote that inadequate exposure of the glenoid rim was the principal reason for so many of his contemporaries to miss what he described as the essential feature of recurrent anterior shoulder instability. Bankart repeatedly emphasizes the fact that the shoulder capsule is not naturally a tense structure and that detachment of the capsuloligamentous junction from the anterior half of the glenoid rim is the principal cause of recurrent instability. In the same article, Bankart described his technique for repairing this defect and presented limited outcomes of 4 patients in which he had performed this technique, 2 epilepsy patients and 2 soccer players.

The original Bankart repair

Bankart's original technique involved a wide surgical exposure of the anterior glenoid. He used a coracoid osteotomy and subscapularis tenotomy. This was performed in a supine position with the arm internally rotated and a sandbag placed under the scapula. Bankart prepared the glenoid rim with a broad osteotome to allow healing of the “glenoid ligament” (now known as the glenoid labrum). Bankart described repair of the capsulolabral tissue using interrupted silkworm gut sutures. The subscapularis tendon was reattached and the coracoid osteotomy was repaired. Postoperatively, Bankart placed his patients into an adduction bandage for 4 weeks to allow healing before active and passive movements are commenced. In 1938, Bankart published a more extensive description of his repair technique, including surgical illustrations, in 1938 in

the *British Medical Journal*.³ The key steps are summarized in [Table I](#).

A video of Blundell Bankart performing his Bankart repair in 1951 was found in the library of Mount Vernon Hospital (London, UK), where Bankart practiced at the end of his career. The technique shown in the video was similar to what was first described by Bankart in 1923 and 1938. On close inspection of this historic video, several modifications from the original description can be seen. Most appear to be a reflection of improved instrumentation permitting easier application of specific surgical steps, such as the use of a right-angled dental drill to create bone tunnels in the glenoid. Another modification is the use of the same right-angled drill to create pairs of holes for the coracoid osteotomy repair. In this video, Bankart used smooth flexible stainless steel wires to repair the coracoid osteotomy site. The video also demonstrates excision of the labrum, which is also different from the original technique. In this case, Bankart opted to attach the free lateral edge of capsule directly to the glenoid rim while removing the labrum.

Bankart never published any outcomes of his technique. However, in 1957 colleagues at the Middlesex Hospital (London, UK) published a study of 50 patients operated on by Bankart and his colleagues between 1924 and 1954.¹⁰ In this series, they noted that the Bankart lesion was found in

32 of 50 shoulders. Two of 50 (4%) cases demonstrated recurrence; however, it was noted that 1 case did not have a classic Bankart lesion and subsequently only had an inferior capsular plication procedure. The other case of recurrence occurred 7 years after surgery following a violent fall and required no further treatment after relocation. The average loss of external rotation was 20° compared with the opposite side, and 50% patients had a <10° deficit. In 1943, surgeons treating Naval Servicemen in the United States modified Bankart's technique to use a new staple device to fix the capsulolabral tissue.¹² They also chose not to perform the coracoid osteotomy in 5 cases. They reported on a series of 31 Bankart repairs (17 with the staple fixation method) and noted no recurrences.²⁵

The modern Bankart repair

Over the past few decades, shoulder surgery has seen significant innovation in implants and instrumentation. This is particularly evident with the development of shoulder arthroscopy. The modern Bankart repair is now frequently performed arthroscopically and may use a variety of implant options. The shoulder arthroscope affords significantly improved visualization of the entire glenoid labrum and adjacent structures. Research in shoulder instability has

Table I Description of the key surgical steps in the original Bankart repair

Surgical step	Description
Positioning	Supine with sandbag between scapulae and a sandbag behind the elbow
Incision	5" incision starting just below the clavicle, immediately above the coracoid process, extending inferiorly and laterally along the anterior border of deltoid (mobilize the cephalic vein medially with the pectoralis major; ligate the branch of the thoracoacromial artery)
Coracoid osteotomy	Osteotomize the coracoid approximately 0.5" from its tip and retract it with its attached muscles inferiorly
Subscapularis tenotomy	Externally rotate the arm, pass an aneurysm needle under the subscapularis tendon, and incise the tendon longitudinally, near the lesser tuberosity. Retract the subscapularis medially.
Identify the detached glenoid ligament (labrum)	Inspect the anterior rim of the glenoid and identify the detached glenoid labrum.
Prepare the glenoid rim	Use a broad osteotome to raise a thin sliver of bone from the anterior glenoid rim and neck. Try to preserve its attachment to the glenoid neck.
Create bone tunnels through the glenoid rim	Use a special retractor (Bankart skid) to displace the humeral head posteriorly. Use sharp-pointed forceps to create 2 pairs of holes from the anterior glenoid neck to the anterior glenoid rim.
Passage of sutures around labrum	Pass a silkworm gut suture through each pair of holes in a horizontal mattress configuration starting inferiorly. Pass each free suture through the junction between the labrum and the capsule and tie.
Double-breasting of the glenoid sliver of bone (optional)	If the sliver of bone created is still attached to the glenoid neck, then place it over the repair and suture with catgut suture.
Repair subscapularis tenotomy	Side-to-side suture repair using catgut sutures.
Repair coracoid osteotomy	Suture repair of the osteotomy site using 1 or 2 silkworm-gut sutures.
Fascia and skin closure	Continuous catgut suture to close the deep fascia and subcuticular layer of skin.
Dressings and aftercare	Apply simple dressings and bandage the arm in neutral abduction for 4 weeks. Commence active and passive range of motion exercises after 4 weeks.

expanded to accompany the evolution of arthroscopic techniques. Surgeons' understanding of concomitant injuries (eg, humeral avulsion of glenohumeral ligament [HAGL] lesions, Hill Sachs lesions, and glenoid bone loss) has brought about innovative solutions, such as the remplissage procedure. There is still a great debate regarding how bone loss, both on the humeral and glenoid sides, may influence the effectiveness of a Bankart repair to restore long-term stability to the shoulder. Additionally, arthroscopic techniques avoid the need to perform a coracoid osteotomy, subscapularis tenotomy, or capsulotomy to gain access. This may cause less scarring and better preservation of normal glenohumeral motion. The innovation of suture anchors has precluded the need for bone tunnels. Newer knotless all-suture anchors have provided smaller options for suture anchors with the goal of better bone preservation. However, with the plethora of available arthroscopic implants comes a significant increase in the variation of surgical techniques. No surgical standard has

been developed, and surgeon preference continues to drive this variation. [Table II](#) outlines the similarities and differences between 2 modern, yet contrasting, arthroscopic techniques. Both have been described in the literature as a Bankart repair.^{22,34}

Comparison between the original and the modern Bankart repair

A side-by-side comparison of the original Bankart repair (performed by Blundell Bankart) and the modern arthroscopic Bankart repair (performed by Dr Peter Millett) is presented in [Video 1](#). The similarities and differences between the original and modern Bankart repair techniques are discussed in this section, and summarized in [Figure 1](#).

The similarities between the modern arthroscopic Bankart repair and the original description by Blundell Bankart lies in their philosophies of the surgical approach,

Table II Comparison of 2 modern arthroscopic Bankart repair techniques by Dr Peter Millett (Vail, CO, USA) and Dr Hiroyuki Sugaya (Tokyo, Japan).

Surgical step	Millett technique	Sugaya technique
Patient positioning	Beach chair with pneumatic limb positioner	Beach chair with pneumatic limb positioner
Portals used	Posterior (viewing portal), anteroinferior, and anterosuperior portals	Posterior (viewing portal), anteroinferior, and anterosuperior portals
Mobilisation of Bankart lesion	Soft tissue shaver to debride any frayed edges, square labral elevator to mobilize labrum from glenoid neck, if required: hooked radiofrequency ablator to mobilize adherent glenoid labrum from the glenoid neck	Straight and angled rasps to elevate the labrum, release the posterior band of IGHL using arthroscopic scissors, placed through the inferior rotator interval portal
Preparation of the glenoid rim	Rasp or oscillating burr	Ring curette to remove 4-5 mm of cartilage from glenoid rim and rasps to prepare the glenoid neck
Suture anchors used	Knotless all-suture anchor with UHMWPE multifilament braided suture (1.8 mm)—typically 4	4× knotted double-loaded UHMWPE multifilament braided suture anchors
Passage of sutures around labrum	Angled suture lasso device with nitinol wire for shuttling sutures	Caspari punch at the capsulolabral junction at 6:30-o'clock; angled suture lasso with nitinol wire for suture shuttling
Associated surgical procedures (routinely performed)	As guided by concomitant pathology	Rotator interval closure (SGHL to subscapularis) with 2× simple interrupted sutures, performed with arm in neutral abduction and >60° external rotation
Rehabilitation	Sling for 4 weeks with gentle passive range of motion within safe limits protecting the repair (limit ER to 30°). Full unrestricted passive motion from week 5 and commencement of active range-of-motion exercises. Open-chain strengthening exercises from week 6-7. Return to full activities by 4 mo.	Sling for 3 weeks, then commencement of passive and active-assisted exercises. Return to noncontact, nonthrowing sports at 3 mo. Return to throwing or contact sports at 6 mo.

UHMWPE, ultra-high molecular weight polyethylene; SGHL, superior glenohumeral ligament.

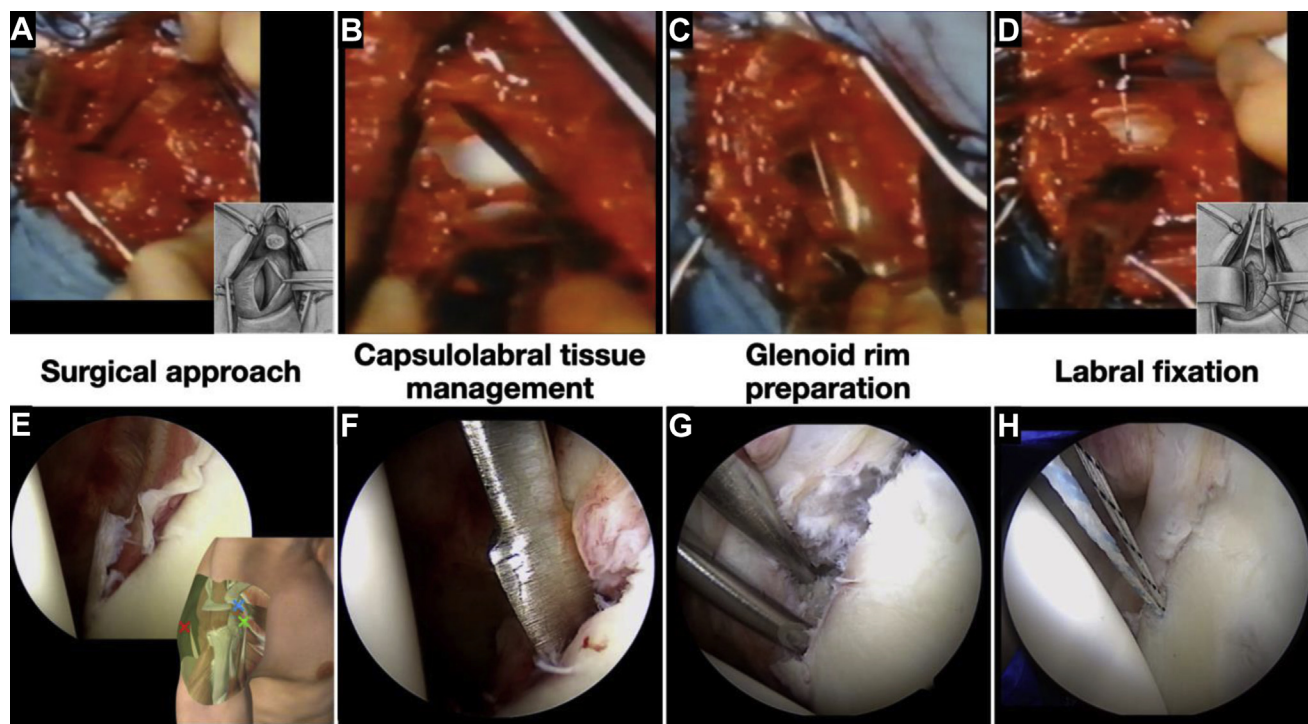


Figure 1 Comparing key components of the original (top row) to the modern (bottom row) Bankart repair techniques. (A) Deltopectoral approach, coracoid osteotomy, subscapularis tenotomy, and capsulotomy. (B) Bankart excising the detached labrum in favor of reattaching the capsule to the glenoid. (C) Bankart using a broad osteotome to prepare the anterior glenoid rim/neck. (D) A right-angled dental drill creating 2 pairs of holes for passage of sutures from the capsule through the glenoid. (E) The 3 arthroscopic portals commonly used in the modern technique. (F) A square-end tissue elevator used to mobilize the labrum. (G) Use of an oscillating burr to prepare the glenoid rim. (H) A knotless all-suture anchor inserted into the glenoid for labral fixation.

surgical goals, and the philosophy of the principal cause of recurrent instability. Thus, the principles around both surgical approaches are the same. It may seem, on initial review, that Bankart's surgical exposure is the polar opposite to the modern arthroscopic technique. Bankart described his very extensive anterior surgical approach, using a coracoid osteotomy and subscapularis tenotomy.³ The contemporary open Bankart typically avoids a coracoid osteotomy and involves a subscapularis split and capsulolabral repair with suture anchors, which is possible with modern instruments and retractors. The modern arthroscopic technique typically uses 3 or 4 portals, with 2 portals commonly placed low and high within the rotator interval.^{22,34} Bankart also mobilized the labral tissue using forceps and a scalpel while the modern techniques use a variety of rasps and arthroscopic tissue elevators to mobilize the adherent labrum from the glenoid neck.³ One technique includes the addition of a ring curette to remove a narrow rim of cartilage along with extension of the Bankart lesion to include release of the posterior band of inferior glenohumeral ligament with arthroscopic scissors.³⁴

The bony bed preparation for healing differs between the original and the modern Bankart repair. Bankart used a broad osteotome to elevate a sliver of bone with periosteum

from the anterior glenoid neck.³ The modern technique uses rasps or shavers and burrs to prepare the glenoid rim bone bed.²² Some surgeons also remove a few millimeters of peripheral cartilage from the glenoid rim to aid healing directly to bone.³⁴ Suture anchors were not available when Bankart described his technique for fixation of the capsulolabral tissue to the glenoid. However, the location of his repair is similar to that used in the modern technique. In [Video 1](#), we can see Bankart opting to excise the labrum and attach the free edge of the capsule directly to the glenoid rim. The modern technique preserves the labral tissue if possible and aims to reattach it to the glenoid face. Greater emphasis has been placed on the inferior capsular shift in the modern technique.²² Bankart, however, did not believe that the capsule should be shifted to achieve a reduced capsular volume as he believed that the native shoulder capsule is naturally a loose and elastic tissue.² Modern techniques have also attempted to address the additional pathoanatomic contributors to instability that have been identified in the decades since Bankart practiced.²⁰ Bankart passed sutures using straight needles with islets whereas the modern technique has evolved to permit a variety of suture-passing options including lasso devices, curved suture passers for shuttling, and preloaded automated needle-firing suture passage devices. Bankart placed

his patients into a bandage with the arm in 0° abduction, whereas now most surgeons prefer modern slings and shoulder immobilizers. The rehabilitation protocols have seen significant divergence among surgeons with the emergence of enhanced recovery protocols and specific tools for recording and monitoring preparedness for return to sport and other activities. The general trend has been toward a tailored, patient-specific approach through better understanding of mechanisms that underpin successful recovery.

Excellent exposure and visualization are hallmarks of any well-done surgical procedure. Bankart firmly believed that one of the reasons his contemporaries did not identify the principal cause of recurrent instability, the labral detachment defect, was inadequate visualization of the anterior glenoid.^{2,3} Similarly, the proponents of arthroscopic shoulder stabilization surgery state that total intra-articular visualization is afforded by the arthroscope and moreover arthroscopy provides superior visualization compared with any open approach. Bankart believed that surgical techniques aimed at limiting normal shoulder movements in order to provide stability were doomed to failure.³ His technique was developed to avoid the need to overtightening the anterior capsule and/or subscapularis, which was a popular procedure of his time. Bankart appropriately believed that these techniques did not address the primary pathology and caused unnecessary reduction in range of motion. The modern Bankart repair also subscribes to this belief, opting to restore the normal anatomy of the shoulder while avoiding scarring. Finally, both the original and modern Bankart repair techniques aim to address the anteroinferior labral detachment from the glenoid rim, which is the cause of instability. Aside from sharing similar principles, both techniques sought to share common steps, albeit with differences in execution. After visualization of the Bankart lesion, both techniques seek to mobilize the labrum adequately, and then prepare the glenoid rim to permit healing. Attachment of the capsulolabral tissue to the glenoid rim securely is then performed.^{3,22} Lastly, although there have been advances in variations of the rehabilitation following Bankart repair, both the original and the modern techniques were rehabilitated with broadly similar principles—that being a short period of immobilization in 0° abduction followed by passive and active exercises aimed at restoring full range of motion soon thereafter.

The future of Bankart repair

There is discussion at present regarding the future of the Bankart repair. With greater understanding of the pathology behind anterior shoulder instability comes greater appreciation of the spectrum of disease. Key areas of debate are centered around its use in specific patient groups, contra-indications, and concomitant procedures. Some surgeons

have found high recurrence rates in male contact athletes and some have been proponents of the modern open Bankart repair, whereas most surgeons still prefer arthroscopic repair in the majority of patients.^{31,36} Since the identification of glenoid bone loss as a risk factor for failure following Bankart repair, including the “on-” vs. “off-track” concept, significant research has been conducted to identify a threshold beyond which performing a Bankart repair would lead to high rates of failure. There is still dissonance among surgeons as to this threshold value and appropriate treatment.^{15,32,33}

Although largely ignored until recently, Hill Sachs lesions also play an important role in recurrence and surgical decision making. Eve was the first to describe the defect that is now referred to as a Hill Sachs lesion in a case report in 1880.¹³ Hill and Sachs described a “grooved humeral head defect” commonly associated with shoulder dislocation in 1940.²⁰ Significant research has been conducted to better understand the influence of this defect on shoulder instability following Bankart repair.^{8,9,18,23,38} A number of concepts have been developed and validated to aid in surgical decision making. New techniques have been developed to address Hill Sachs lesions considered to influence stability following Bankart repair. Doubt still remains as to the most reliable method of assessing and addressing Hill Sachs lesions that may contribute to recurrent instability following surgery. In the context of minor glenoid bone loss and small Hill Sachs defects, some surgeons advocate bone block procedures.^{4,5} Others advocate arthroscopic Latarjet for all cases of recurrent anterior shoulder instability.⁶ The on- vs. off-track concept is a modern way to objectively evaluate glenoid bone loss and the Hill Sachs lesion, which aids in decision making.⁸ However, if a Latarjet procedure is considered, the on- vs. off-track concept should be evaluated with the addition of the width of the coracoid to determine if they will become on track.²⁴

Most shoulder surgeons still use a modern version of the Bankart repair for the majority of their primary cases of recurrent traumatic anterior shoulder instability. There has been a significant number of variations in the surgical technique as a result of, in part, the evolution of implants and instruments. This can pose a challenge when comparing outcomes between modern studies. Excellent outcomes are reported in the short term with the modern Bankart repair; however, some studies have shown higher recurrence rates in the medium to long term.^{14,28} Our understanding and appreciation for how glenoid and humeral bone loss influences failure is improving and expanding. In the future, we may see innovations in surgical decision-making algorithms to include virtual simulation models based on individual patient computed tomography/magnetic resonance imaging data. We may also see the development of artificial intelligence-driven deep learning models using large data resources in those with recurrent shoulder instability. This may improve the accuracy of prediction of Bankart failure, which may help guide

surgeons' decision making. Bankart's philosophy was revolutionary in that addressing the primary pathology of capsulolabral detachment without compromising native joint motion still holds true today many decades later.

Conclusions

Blundell Bankart's description of the essential lesion of recurrent anterior shoulder instability in 1923 changed how the surgeons from all over the world treat this common pathology. His philosophy was clear and insightful and far ahead of his time in describing reattachment of the capsulolabral tissue to the anterior glenoid while maintaining the native joint's motion. Decades later, surgeons still subscribe to this philosophy and employ a modern version of the original Bankart repair. Significant variations in the modern arthroscopic Bankart repair exist related to improved instrumentation and implants. However, many similarities to the original technique still hold true. The Bankart repair remains a workhorse for most surgeons treating traumatic recurrent anterior shoulder instability. The future of the technique is likely to continue to evolve and improve in a patient-specific way. The optimal indications, contraindications, and efficacy of the many subtle technical variations require continued investigation.

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Supplementary data

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