Review article

Eponymous terms in anterior shoulder stabilization surgery

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A B S T R A C T

Shoulder dislocation and its treatment are probably as old as time. Surgical treatment has gained acceptance recently, especially in recurrent cases. Within roughly the last 100 years, numerous treatment strategies have been developed and questions elucidated regarding the entity of shoulder instability. Shoulder instability holds many eponymous terms. By means of literature and historical research, we present the biographical background of some common eponymous terms and the original publication on which those terms are based. We describe the Perthes lesion, Bankart lesion and repair, Hill-Sachs lesion, Bristow-Latarjet procedure and Eden-Hybbinette procedure. Shoulder instability has been recognized and treated for many centuries. Before the invention of X-rays and the ability to intervene surgically, empirical reduction and time were the only feasible treatment options. Understanding of the pathophysiology of this problem and its corresponding treatment has kept increasing since the 19th century. The originators involved still have their name attached to the different signs and procedures.

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1. Introduction

The presumed first description of a dislocation of the shoulder joint is from an Egyptian papyrus known as Ebers’ papyrus, dated around 1522 B.C., as well as a picture from an Egyptian grave from 1200 B.C., which may be depicting a reduction method quite similar to Theodor Kocher’s (1841–1917). Recently, however, the question has risen as to whether this picture represents a person waking up a fellow worker instead of an attempted reduction [1]. The most detailed early description originates from Hippocrates around 400 B.C. It describes the anatomy, type of dislocation and reduction maneuver as well as the first surgical method for prophylaxis of recurrent dislocation. In time, treatment of shoulder instability became more sophisticated and has evolved to minimally invasive surgical procedures.

Eponyms related to shoulder instability and its surgical treatment will be discussed (Fig. 1a and b). Each eponym will be accompanied by a biography and the original description based on which the eponym was established. This will improve understanding of the pathology of the condition and provide an insight into those who cleared the way for contemporary shoulder surgeons to treat this condition optimally. The discussed eponymous terms are not an exhaustive list and the choice of terms was based on availability of the original references and biographical information of the original authors.

2. Perthes lesion

A Perthes lesion refers to an anterior glenohumeral labral tear that occurs when the scapular periosteum remains intact but is stripped medially and the anterior labrum is avulsed from the glenoid but remains partially attached to the glenoid neck by an intact periosteum [2]. Recurrent dislocation occurs due to insufficiency in its function of anchoring the attached inferior glenohumeral ligament [3].

2.1. Georg Clemens Perthes

Georg Clemens Perthes (1869–1927) was born in Moers, Germany (Fig. 2). After studying medicine in Bonn, he received his doctorate in 1891. He started to work in Bonn and Leipzig, and later on worked with Friedrich Trendelenburg (1844–1924) [4].
From 1900 to 1901, he was a military surgeon at the German colonial seaport of Tsingtao (nowadays Qingdao), China. In 1910, he became head of the surgical clinic in Tübingen [4]. Perthes was heavily involved in research with Wilhelm Röntgen’s newly (1895) discovered X-rays. He pioneered the use of radiology for the treatment of warts, skin cancer and breast carcinomas. Today he is best known for Perthes’ disease, also known as Legg-Calvé-Perthes disease, a childhood developmental disorder of the hip joint [5]. Perthes took the first X-rays of a patient with this disease in 1898. While in Tsingtao, he had the opportunity to conduct radiological studies on the feet of Chinese women that had been subjected to the traditional practice of Lotus foot binding. Perthes died of a stroke in 1927 in Arosa, Switzerland [4,5].

2.2. Clinical implications

The Perthes lesion is closely related to and often confused with the Bankart lesion [3,6]. In contrast to Bankart lesions, in Perthes lesions the labrum remains attached to the glenoid. This may offer options for non-operative treatment. Possibly immobilization of the shoulder in external rotation after a first-time traumatic shoulder dislocation is most effective in patients with Perthes lesions showing low-grade plastic deformation compared to Bankart lesions [7].

3. Bankart lesion and repair

The lesion described by Bankart in 27 cases is a variation of the Perthes lesion. When the humeral head dislocates, the ligaments between the humerus and glenoid stretch and will subsequently avulse the anteroinferior labrum from the glenoid rim [8]. A bony Bankart lesion refers to a bony fracture of the rim of the glenoid. It is believed that bony Bankart lesions occur with the arm in the midrange as the ligaments are not tensioned and the force of trauma will rather cause bony lesions instead. When compared to erosion-type changes of the glenoid rim, it is suggested that the position of the arm and the direction of the trauma mechanism also account
for the type of glenoid rim lesion that occurs. It should be noted that “bony Bankart” is a confusing term, as Bankart wrote explicitly that he had never seen recurrent dislocation after glenoid fractures or bony abnormalities [8]. A Bankart repair is done by roughing up the anterior bony margin of the glenoid and reattaching the ligament, labrum and capsule to the anterior margin of the glenoid with sutures [8].

3.1. Arthur Sydney Blundell Bankart

Arthur Sydney Blundell Bankart (1879–1951) was born in Exeter as the son of James Bankart, a local surgeon (Fig. 3) [9]. Blundell Bankart became a doctor in 1906. He started his career at Guy’s Hospital, becoming a fellow of the Royal College of Surgeons in 1909 and a Master of Surgery at Cambridge one year later [10]. Since 1909, he was employed at the Royal National Orthopaedic Hospital, where he developed his precise and fast surgical skills that so impressed his pupils. He achieved record turnovers when other surgeons went on holiday, and until the end of his career Bankart considered an 8-hour operating session as the ideal way to spend the day [5,9,10]. Apart from orthopedics, Bankart also practiced neurosurgery (spinal and cranial) and pediatric surgery. Being a hard worker, he developed a characteristic walk that was more of a run, as he would rather run up a flight of stairs than wait for the elevator [9].

During World War I, he doubled efforts when he joined the staff of a number of smaller military hospitals too. He also collaborated with Robert Jones in London’s newly opened 800-bed Military Orthopedic Centre at Shepherd’s Bush. During World War II, he kept at it and cared for another 100 temporary beds at Mount Vernon Hospital [5].

Bankart was a man of great integrity, with no interest in showmanship. He believed that if an idea was good, others would soon accept it. Bankart held various positions with the Royal Society of Medicine and was co-founder, secretary, and president of the British Orthopedic Association. He was also a honorary member of the French Orthopedic Society. Although he did not easily establish close personal relationships with colleagues, he really enjoyed other people after overcoming his initial shyness. Whereas Bankart was tolerant of error, he suffered no fools [9,10].

Bankart happily continued working after his retirement in 1946 (two years after his official retirement age), and even went on operating. On April 8 1951, he operated at Mount Vernon Hospital until 8 PM. On his way home his car got a flat tire; he changed the tire, drove home, and died in his sleep at the age of 71 [5,9,10].

3.2. Clinical implications

Bankart lesion is a common finding in shoulder instability [11–13]. With persisting instability this lesion is the point of engagement during surgical treatment. The problem lies in distinguishing between reports on true Bankart lesions and bone deficiencies after shoulder luxation [14–16]. Interpretation of reviews on Bankart lesions making this distinction remains a challenge.

4. Bristow-Latarjet procedure

Although there seems to be no definitive description of the Bristow-Latarjet procedure, the operations performed by both Bristow and Latarjet should probably not be considered to be identical. Latarjet originally described his technique of anteroinferior glenoid stabilization by placing a bone block from the coracoid on the glenoid rim after removal of the periost and detachment of the subscapular muscle. The bone block consisted of the entire horizontal pillar of the coracoid and was fixed with one screw, and the subscapularis was reattached, overlapping to create the needed tension [17,18]. The technique of Bristow was described by his student Helfet, 10 years after Bristow had died, and differed only slightly from Latarjet’s. The subscapularis was not detached but opened vertically for 2.5–3 cm and the coracoid bone block was not fixed with screws, only the conjoined tendon was fixed with sutures to the subscapularis. Also, Bristow only used the tip of the coracoid [19].

4.1. Walter Rowley Bristow and Michel Latarjet

Walter Rowley Bristow (1882–1947) was born in Bexley, Kent (Fig. 4). He was conspicuous for his athletic skills and became close friends with Cathorne Girdlestone (1881–1950) during his medical education at St Thomas’ Hospital medical school. After graduating, he started working as surgeon at St Thomas’ in 1910, where he returned in 1919 after serving as a medical officer in World War I to form the orthopedic department. During the war, he was at the Suvla Bay Landing in Gallipoli as part of the Middlesex Yeomanry. During World War II, St Nicholas’ Home for Crippled Children, where Bristow worked, was used to treat injured servicemen and in 1948, the hospital was renamed Rowley Bristow Hospital. Funds from the sale of the land were used in 1998 to finance the Rowley Bristow Orthopaedic Unit at St Peter’s Hospital in Chertsey. In the interbellum, Bristow conducted his practice from 102 Harley Street, which was the scene of bountiful hospitality and legendary lunches and dinners until the Luftwaffe blasted it into ruins in the next war. During World War II, he organized the orthopedic sections of the military hospitals in Great Britain as Consulting Orthopaedic Surgeon to the army in the rank of Brigadier.

He was known as a great teacher and therefore loved and remembered by many of his students. One of his aphorisms was “we treat patients, not disease”. He married in 1910 and had a son and two daughters [5]. Bristow never described his shoulder stabilizing...
technique himself, but taught it to his students. Some argue that Bristow himself probably never performed the Bristow procedure [20,21].

Michel Latarjet (1919–1999) was born in Lyon, France (Fig. 4). His father, André Latarjet, was a renowned surgeon and worked as professor of anatomy in Lyon. In 1936, Michel Latarjet became an assistant of anatomy, only to become prosector the next year. He graduated from medical school in 1939. His thesis was on the treatment of bronchiectasis, revealing his interest in thoracic surgery. During World War II, Michel Latarjet created a mobile group of surgeons and experienced the need for continuous ambulance service to and from the battlefield, for which he was decorated with the croix de guerre (war cross). In 1942, he became chief of an anatomy department and in 1946, professor of anatomy, at the age of 33. In 1953, Latarjet started his surgical training. His work in the field of thoracic surgery included surgical treatment of dislocating shoulders that ended up close to the thoracic wall. He published his paper on stabilizing surgery for traumatically dislocated shoulder in 1954. In 1958, he became the head of the thoracic surgery department at Jules-Courmont hospital in Lyon. He continued publishing on anatomy during his entire career and revised his father’s anatomical work in 1949, only to publish his own in 1983, in which the best drawings of his father’s work were preserved. After suffering a cerebrovascular accident with Broca’s aphasia, Michel Latarjet died in 1999 [5,21,22].

4.2. Clinical implications

Clinical implications of Bristow-Latarjet are hard to establish, as it comprises two techniques [21,23,24]. The technique has evolved and changed almost completely from the original description as far as method of fixation and position of the bone block is concerned [21,25]. Additionally, stabilization is sometimes even performed arthroscopically [26]. Still, the concept of bony stabilization for anterior shoulder instability remains an important modality in the treatment of this condition, with excellent long-term results [26,27].

5. Eden-Hybbinette procedure

Eden described the transplantation of an osseous fragment from the tibia to the anterior border of the glenoid. This was placed under the periost and fixed with sutures or screws. He also described reefing of the capsule upon closure of the joint [28]. Hybbinette described the same method but after a while switched to the use of a graft from the iliac crest. He also put the graft beneath the periost but did not fixate it [29]. He described the defect on the anterior side of the glenoid as being a “Gothic arch”; the false joint space underneath the capsule and subscapularis tendon created an opening for the humeral head to repeatedly dislocate into.

5.1. Rudolf Theis Eden and Oscar Samuel Hybbinette

Rudolf Theis Eden (1883–1925) was born in Syuggewarden, Germany, as the first child of three (Fig. 5) [30]. Eden went to a private school. After his home burned down in 1893, the family moved to Oldenburg. Eden started studying medicine in 1903 in Marburg and later in Munich, Göttingen and Berlin before returning to Marburg. He graduated in 1908 and worked briefly in Berlin as a resident in internal medicine [30]. He finished his dissertation on lung collapse therapy in 1910. Afterwards, he started working as a resident in general surgery in Jena. Eden became a general surgeon in 1913. In 1914, he married Daniela Schott in Jena. With the outbreak of World War I, Eden was sent to the western front in Flanders. His first daughter was born during the war, in 1915. They would have a total of five children [30]. In 1916, he returned to Jena to work in the military hospital. He operated experimentally on various conditions, including nerve transplantsations for nerve injuries, which he practiced on animals [30]. On April 25, 1917 he operated for the first time on a shoulder dislocation with a method he developed himself and would later bear his name. After the war he was asked to join the head of his department to start working in Freiburg im Breisgau [30]. There, he developed his surgical skills further and conducted many research projects on animal models. In 1924, at the age of 41, he was invited to work in Innsbruck, but before he was able to do so, he got into a bicycle accident in 1925. He broke his cervical spine, which was treated conservatively with a cast. Unfortunately, he died of a complication in the form of a venous embolism in the vena cava [30].

Oscar Samuel Hybbinette (1876–1939) was born in Stockholm (Fig. 5) [31]. After obtaining his medical degree in 1904, he worked as assistant surgeon for a few years in different hospitals. In 1908, he set up a surgical practice in Stockholm, finally becoming chief surgeon at Hospital Sabbatsberg in Stockholm in 1921. As a trainer of future surgeons, he focused on agility of the resident. He often asked the question: “Can this man hold a knife or not” [31]. Qualities you needed in order to be hired were the ability to run daily hospital matters with good organization and speed without losing preci-
sion and carefulness and, not the least important, a firm handshake. When hired you earned full support. Hybbinette not only wanted to be the chief surgeon, he also tried to be the older experienced comrade that taught and helped the younger gain independence in their actions through support and advice. In 1936, he became professor at the Karolinska Institute [31].

For his 60th birthday, his friends and students published a collection of 39 cases of treated shoulder instability in the way Hybbinette had developed, 32 of which were operated on by Hybbinette himself. Hybbinette was known as an able surgeon, and praised by his colleagues as a renaissance man.

He maintained highly ethical standards. He tried to lower his honorarium for the poorer patients. Allegedly an older lady asked how much the treatment had costed. Hybbinette told her: 75 cents. As a response, the lady gave 1 crown and said that that should suffice. The response of Hybbinette was typical for him, giving her 0.25 crowns in return [31]. He was also known to be a very good tenor. He died of a cerebral hemorrhage in Stockholm, while singing a solo in the piece “Stillaskuggor”, which is sung to honor the dead. Hybbinette is buried in Österåkers cemetery near Stockholm [31].

5.2. Clinical implications

Since the use of the coracoid as anterior stabilizing bone block, the Eden-Hybbinette procedure as primary surgery for shoulder instability seems to have fallen into disuse. Articles found were all from before 2004 and reported on long-term outcome, implying that the procedure is not performed on a large scale anymore [32,33]. Long-term results of the Eden-Hybbinette also seem inferior to the results of the Bristow-Latarjet, especially due to high rates of osteoarthritis [23]. In revision, surgery after Bristow-Latarjet procedure, there might still be a place for the Eden-Hybbinette or a comparable technique with for instance crista bone, as the coracoid is missing in such cases [34].

6. Hill-Sachs lesion

Hill-Sachs lesion is described as a defect in the humeral head after shoulder dislocation. Malgaigne noted in 1832 that after anterior shoulder dislocation a bony defect in the humeral head could be present [35]. This was popularized and described in radiographs by Hill and Sachs. They also made the connection between the fracture and persistent instability. It is a compression fracture that has four radiological characteristics:

- located posterolaterally in the humeral head, only very large defects extend into the greater tuberosity;
- in external rotation the defect is subtle and often overlooked
- the indentation is best seen with the arm in internal rotation and presents as a dense line of “condensation”;
- an avulsed fragment from the humerus is practically never present, there may be a small chip from the inferior portion of the glenoid rim [36].

6.1. Harold Arthur Hill and Maurice David Sachs

Hill (1901–1973) was born in the state of Illinois [Fig. 6] [37] and attended high school in Pasadena, California. He became an MD at the University of California Medical School in 1931. Hill set up a private radiology practice in 1935 at St Joseph’s Hospital in San Francisco, which closed in 1979. During World War II, he served with the US Navy Reserve from 1941 to 1946, rising to the rank of captain [37]. He retired as chief of the radiology department in 1971. He was married and had three children, two sons and one daughter, and was fond of gardening. He died in San Francisco and was inurned at Altadena [37].

Maurice David Sachs (1909–1987) was born in Hartford, Connecticut. He was a radiologist and was affiliated with the San Francisco Department of Public Health. Sachs owned a house in Carmel Highlands that was designed by the architect Olof Dahlstrand. He died in Santa Clara.

6.2. Clinical implications

Attributed to the concept of an engaging deformation of the shoulder joint, identification of a Hill-Sachs lesion is important in recurrent instability. If surgical treatment is indicated a large lesion may also be addressed (remplissage) to lower the redislocation rate after surgical stabilization. Several theories have been developed to determine the relevance of a Hill-Sachs lesion in recurrent shoulder instability [38–40].

7. Discussion

Historically speaking, surgeons have made considerable contributions to the development of the treatment of anterior shoulder instability, and their efforts are still remembered by the pathology or operation that bear their names. The eponymous terms presented by us are not an exhaustive list. The goal of this paper is to familiarize fellow medics with the original descriptions. When using eponymous terms in professional discussions it is important to acknowledge that we might not all have attached the same meaning to a term [41].

The clinical implications given are concise. These are only meant to align the original findings into perspective with contemporary anterior shoulder instability treatment. No attempt was made to conduct an exhaustive clinical review of each condition or technique.

Nowadays, the Bankart repair and the Bristow-Latarjet procedure, or modifications of these techniques, are the most
widely accepted techniques to surgically address recurrent shoulder instability. Inherent to each surgical treatment are possible complications, which are inevitable. In the Bankart procedure, recurrent instability is frequently observed, especially when patients are followed up to 10 years. Results on recurrent instability following the Bristow-Latarjet procedure are more reliable. This is thought to be partially attributed to the increasing diameter of the glenoid surface, yet the hammer effect by the conjoint tendon might be an even more important factor for its stabilizing success. The Bristow-Latarjet however holds other risks, including a high percentage of patients that develop osteoarthritis to some degree. Other typical complications are bone block osteolysis and screw bending, migration or breakage [21,23,42].

Along with improving equipment, both techniques are still evolving. Whereas the Bankart repair has been mostly performed arthroscopically as a standard for quite some time, the Bristow-Latarjet procedure is now being performed arthroscopically too. These developments will continue, hopefully leading to improvements in long-term results to treat anterior shoulder instability surgically. Inventors of improvements of these and other techniques will emerge and may definitely change the way shoulder instability is treated [21].

8. Conclusion

Anterior shoulder instability is a complex injury that can be treated in various ways. We described common eponymous terms used in relation to this injury and its subsequent repair in order to facilitate peer discussions about the techniques. Knowing the history of inventors and their surgical techniques may prevent recurrent mistakes. George Santayana stated: “Those who cannot remember the past are condemned to repeat it”. Mark Twain begged to differ and said: “History doesn’t repeat itself, but it does rhyme”. Whichever the case may be, history is an important part of our contemporary surgical practice and eponyms remind us of the pioneers in our profession. Eponymous terms continue to be widely used in “orthopedic language” despite a general trend toward their elimination. Because of their simplicity and their historical references we believe that eponymous terms contribute to the language of orthopedics.

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The authors declare that they have no competing interest.

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