Review article

Musculoskeletal colloquialisms based on weapons

Anuj Agrawal

Department of Orthopaedics, Sri Aurobindo Institute of Medical Sciences, Indore, MP 452009, India

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ABSTRACT

Eponyms and colloquialisms are commonly used in orthopaedic literature and convey a great deal of information in a concise fashion. Several orthopaedic conditions have characteristic clinical or radiologic appearances, mimicking the appearance of certain arms or weapons. Most of these are easy to memorise and recognise, provided the orthopaedic surgeon is aware of the colloquialism and familiar with the appearance of the weapon on which it is based. Unfortunately, many such colloquialisms are based on traditional weapons no longer in current use, and their appearances are not familiar to most orthopaedists, creating confusion and difficulty in understanding them. In this paper, we have reviewed the musculoskeletal colloquialisms based on weapons, including a brief description of the weapon with illustrations, highlighting the importance of the colloquialism in diagnosis or treatment of musculoskeletal conditions.

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1. Introduction

How medicine and wars are closely related to each other can be gauged from this statement of Hippocrates that “war is the only proper school for a surgeon”. Wars provide an invaluable learning opportunity for surgeons. Injuries of the extremities account for a majority of wartime injuries and thus the orthopaedist plays a prime role in military medicine. By virtue of its close association with wars and weapons, the imagery of war has permeated the orthopaedic vocabulary, with several instances wherein clinical or radiological descriptions draw an analogy to the external appearance or mechanism (e.g. triggering, bowstringing) of a weapon or its part. Such pictorial colloquialisms aid the orthopaedist to easily memorise the condition, in turn aiding in diagnosis and treatment of musculoskeletal diseases.

Many such colloquialisms are based on contemporary weapons (e.g. firearms, bows, cannons) making it easy for modern-day orthopaedicians to understand them. However, a few clinical or radiological colloquialisms are imaginatively named on ancient weapons (e.g. bayonets, tridents, halberds) which may not be familiar to the modern-day orthopaedists, reducing their clinical usefulness. Many such terms, like a ‘bayonet reduction’, are used in day-to-day orthopaedic jargon, but their origin and nomenclature is not known to most surgeons.

In this article, we have attempted to review all the clinicoradiological colloquialisms in orthopaedics based on weapons or parts thereof. To keep it concise, we have strictly included the colloquialisms based on weapons and not other military or weapon-related things (e.g. a military march, targets). Also, we have not included colloquialisms based on tools (e.g. hammers, hatchets) or sporting equipment (e.g. golf-clubs, hockey sticks) which can potentially be used as weapons, but are not intended for that purpose.

2. Clinicoradiological colloquialisms based on contemporary weapons

2.1. Firearms (guns)

Firearms or guns are portable, barrelled weapons which launch metal projectiles (bullets or shells), driven by the propellant action of an explosive substance like gunpowder. Long guns are designed to be held and fired using both hands, whereas handguns (e.g. pistols, revolvers) are smaller firearms designed for single-handed operation. The long guns can either be shotguns (usually with a smooth barrel) or rifles (with a spirally fluted barrel). The different parts of a gun are shown in Fig. 1, namely the barrel, action (including the trigger) and the grip or stock. All the parts of firearms have inspired colloquialisms in orthopaedics, as shown in the figure.

Gun barrels are metal tubes which fire the projectile (bullet or shell), and can be either smooth or rifled, single or double (or rarely

E-mail address: anuj_aaiims@yahoo.co.in.

Fig. 1. Different parts of a gun, with associated musculoskeletal colloquialisms.

multiple). The 'gun barrel sign' is described in hammer or claw toes, in which extension at the metatarsophalangeal joint of the foot causes the proximal phalanx to be viewed end-on in an AP X-ray of the foot, resembling a smooth barrel gun (Fig. 2A).¹ Similarly, a 'gun barrel sign' of the distal phalanx can be observed in mallet toe.² Though the diagnosis of hammer/claw/mallet toes is made clinically, gun barrel sign serves as a useful radiological marker for these. A 'rifle barrel sign' was previously described on AP X-ray of a shoulder with posterior dislocation,³ due to rifling seen within an internally rotated humerus, but has been found to be a misnomer and is no longer in clinical use. A 'double-barrel' fibular graft is a configuration of vascularised fibular graft in which the graft is osteotomised and folded back (doubled) on its periosteal hinge (Fig. 2B) like a double-barrel gun. It has been found useful to fill the defect in large bones like femur and tibia, particularly in the metaphyseal regions.⁴ Even triple- or quadruple-barrel graft configurations⁵ have found occasional application (e.g. in spinal reconstructions), similar to multi-barrel guns.

Firearms use *triggers* to initiate the firing of a cartridge. A trigger has to be pressed with some force culminating in the sudden release of a hammer or striker to discharge a cartridge. This mechanism of a trigger has inspired the nomenclature of 'trigger digits' (trigger finger or trigger thumb), a common hand ailment first described by Notta in 1850.⁶ In this condition, narrowing of an annular pulley (commonly A1) formed by the flexor sheath obstructs the smooth gliding of the tendon, requiring forceful movement to negotiate the pulley, with a painful popping or clicking sound or sensation (Fig. 2C). A trigger digit is commonly referred to as 'stenosing tenosynovitis', though the latter is a misnomer, as the pathophysiology actually involves tenovaginitis of the tendon sheath.⁶

Guns have to be firmly held to bear the recoil forces of a shot. A handgun has a *pistol-grip* to be gripped firmly in one hand, while a long gun has a *gunstock* to be held firmly against the hip or the shoulder. A gunstock lies at an angle with the barrel (Fig. 1), which has led the orthopaedists to call a simple deformity like cubitus varus, commonly seen after supracondylar fractures of humerus in children, as a 'gunstock deformity'. An upper limb with cubitus varus resembles a gunstock in appearance, particularly in an abducted position of the arm (Fig. 3A). The current management of displaced supracondylar fractures with percutaneous pinning aims to avoid this gunstock deformity. Pistol-grips provided a better grip and control of the firearm than gunstocks. The firm grip provided by pistol-grips was found useful for many hand tools, and pistol-grips were widely adopted in machinery including orthopaedic drills, saws and reamers (Fig. 3B). A *pencil-grip* is more useful for fine control in surgeries on small bones of the hand, foot or face. 'Pistol-grip deformity' (Fig. 3C) refers to the radiological appearance of the proximal femur in which the femoral head-neck junction becomes flattened or convex, with a decreased head-neck offset. This sign was first described by Stulberg et al. in 1975, who identified the association between the abnormal hip morphology and subsequent osteoarthritis of the hip.⁷ The term 'femoroacetabular impingement' (FAI) was used for this clinical entity by Mayer et al. in 1999, further differentiated into 'cam' and 'pincer' types.⁷ Pistol-grip deformity is a characteristic radiological sign of cam-type of FAI, more commonly seen in young males.

A *bullet* is the projectile fired by a firearm. The design of the bullet evolved from spherical to conical (pointed) ones, to the modern elongated bullets with a pointed nose (Fig. 4A). 'Bullet-shaped vertebrae' (Fig. 4B) refers to flattened vertebrae (platyspondyly)

Fig. 2. (A) Gun barrel sign. (B) 'Double-barrel' vascularised fibular graft. (C) Trigger finger.

Fig. 3. (A) Gunstock deformity of upper limb. (B) Pistol-grip drill. (C) Pistol-grip deformity of femur.

with an anterior beak, commonly seen in the dorsolumbar region in mucopolysaccharidoses (MPS), achondroplasia and congenital hypothyroidism.^{8,9} In Morquio syndrome (MPS IV), there is anterior central beaking of the vertebra with marked platyspondyly, whereas in Hurler syndrome (MPS I), the beaking is anteroinferior with less marked platyspondyly. The metacarpals and phalanges too are tapered and described as 'bullet-shaped' in mucopolysaccharidoses (Fig. 4C).^{8,9}

2.2. Bows

Bow and arrow is a projectile weapon system in use since prehistoric times and common to most cultures. Presently, bows and arrows are primarily used in the sports of archery, though their use as a weapon is still prevalent amongst tribal populations. A bow essentially consists of a pair of curved limbs joined by a riser, with the ends of the limbs fastened by a string called *bowstring*. Both the

Fig. 4. (A) Common types of bullets. (B) Bullet-shaped vertebra. (C) Bullet-shaped metacarpals and phalanges.

Fig. 5. (A) Anterior bowing of ulna in Monteggia fracture-dislocation. (B) Bow legs. (C) Longitudinal 'bow arch' of foot. (D) Bowstringing of flexor tendon of index finger. (E) Bowstring test.

curved shape of a bow and the taut bowstring have inspired musculoskeletal colloquialisms.

Any bending of a bone in an arc-like shape is known as *bowing* and may be congenital (e.g. anterolateral and posteromedial bowing of tibia), or acquired (e.g. shepherd crook deformity in fibrous dysplasia). 'Bowing fractures' (Fig. 5A) are a special type of fractures seen in children, in which a bone undergoes plastic deformation following trauma, without any obvious breach of cortex. Bowing can be significant in the diagnosis and management of certain fractures, like bowing of ulna requires correction in Monteggia fracture-dislocations in children. 'Bow legs' is commonly used for genu varum deformity (Fig. 5B) with outward bowing of the knees, which may be physiological in infants or pathological due to diseases like rickets, Blount's disease, osteoarthritis, etc.

The term *bowstring arch* is an engineering term used for tied-arch bridges, in which the downward forces on the top arch are restrained by a bottom chord tying the two ends of the arch like a bowstring. The longitudinal and transverse arches of the foot are conceptualised as bowstring arches, with the ends of the arch being held together by muscles, tendons or ligaments of the foot. The plantar fascia, in particular, acts like a shock-absorbing bowstring to maintain the longitudinal arch of the foot (Fig. 5C).

Bowstringing of tendons refers to the prominent displacement of a tendon away from a joint, due to an injury to the tendon pulleys (Fig. 5D). With the tendon pulled away from the centre of rotation of the joint, its moment of excursion is reduced and it is no longer able to produce normal range of movement. Except after

surgical intervention, clinically obvious bowstringing is only seen in the thumb and proximal finger, with damage to the A1/oblique and A2 pulleys respectively.¹⁰ Pulley reconstruction is required for symptomatic bowstringing.

'Bowstring sign' (or posterior tibial nerve sign), first described by Gower in 1888, is used to evaluate lumbar disc herniation.¹¹ In this test, when a positive straight leg raise test is observed, the leg is slightly flexed and pressure applied to the tibial nerve in the popliteal fossa, reprecipitating the pain (Fig. 5E). Popliteal space compression (compression of lateral popliteal nerve, and not medial or lateral hamstring tendons) correlates anatomically with stretch of sciatic nerve. Bowstring test is considered to be the most reliable test for root tension.¹²

2.3. Cannons

Cannonball metastases refer to well-circumscribed, round, pulmonary nodules of varying sizes (Fig. 6), associated with disseminated malignancy. Osteosarcoma and Ewing sarcoma frequently metastasise to lungs and cannonball metastases may be their presenting sign. Though cannonball metastases were previously considered a harbinger of death, the outlook for patients of bone sarcomas with pulmonary metastases has improved in recent times, with significantly higher five-year survival rates reported after pulmonary metastasectomy (PM) both in osteosarcoma¹³ and Ewing sarcoma.¹⁴ Hence, currently the prognosis of sarcoma patients with cannonball metastases is not as bad as the name suggests.

Fig. 6. Cannonball metastases.

2.4. Daggers

A *dagger* is a double-edged knife (Fig. 7A) with a very sharp point, used as a thrusting or stabbing weapon in close combat confrontations. It has been in use since pre-historic times, continued till the modern day.

'Dagger sign' (Fig. 7B) is a radiographic feature seen in severe cases of ankylosing spondylitis, as a single central radiodense line on frontal radiographs, related to ossification of supraspinous and interspinous ligaments.¹⁵ Though the diagnosis of ankylosing spondylitis is usually made by other characteristic radiological features like bilateral sacroilitis, bamboo spine appearance (due to bridging syndesmophytes) and Romanus lesions ('shiny corner

sign', squaring of vertebrae), a 'dagger sign' is a striking radiological feature in advanced cases. The combination of 'railroad track sign' (due to bilateral apophyseal fusion) and 'dagger sign' on an AP spine film is also termed as a 'trolley track sign' (Fig. 7B).¹⁵

3. Clinikoradiological colloquialisms based on ancient weapons

3.1. Bayonet

A *bayonet* is a dagger-like weapon designed to fit at or underneath the muzzle of a long gun, doubling the gun as a spear for close-quarter combat (Fig. 8A). Early bayonets were of the 'plug' type and prevented the gun from firing once fit onto it. 'Socket' bayonets soon replaced them, incorporating a ring mount and an offset blade (Fig. 8A) leaving the muzzle free. These were adopted by most European armies in the 18th century.

The term *bayonet* is frequently employed in orthopaedic literature to refer to a completely offset relationship of two parts (fragments of the same bone, or adjacent bones) due to a deformity or following a fracture reduction. A *bayonet* reduction of a fracture refers to a position with no direct apposition of fracture ends (Fig. 8B), frequently with some associated shortening. A bayonet reduction is usually acceptable in young children with a high remodelling capacity, as in fractures of the femoral and tibial shafts, mid-forearm, proximal humerus and distal radius. In adults, a bayonet reduction is usually not acceptable in long bone fractures, except in humeral shaft and clavicle fractures.

'Bayonet deformity' commonly refers to Madelung deformity of the wrist, in which the hand with the carpus is displaced off the axis of forearm in an ulnovolar direction, resembling a bayonet (Fig. 8C). A 'dinner-fork deformity' of the wrist following a Colles fracture has also been referred to as a bayonet deformity giving rise to confusion. Presently, both the eponym Colles fracture and the colloquialism bayonet deformity for the associated deformity of the wrist, are not recommended and should no longer be used. A 'bayonet leg' similarly refers to a posteriorly dislocated knee following trauma, infections or poliomyelitis.

A

B

Fig. 7. (A) Dagger, a type of knife. (B) Dagger sign.

Fig. 8. (A) A bayonet attached underneath the muzzle of a gun. (B) Bayonet reduction of a distal radius fracture. (C) Bayonet deformity. (D) Bayonet sign.

'Bayonet sign' refers to the appearance of the extensor apparatus of the knee on clinical examination of patients with a torsional malalignment syndrome (squinting patella).¹⁶ Due to the combined femoral anteversion and tibial extorsion, the quadriceps tendon and the tibial shaft assume a zig-zag configuration like a bayonet (Fig. 8D). A similar configuration is also seen in valgus deformity of the proximal tibia, due to an increased Q angle, and that too has been referred to as a bayonet sign.¹⁷ A bayonet sign is an important clue to the underlying pathology in anterior knee pain and patellofemoral disorders.

3.2. Trident

A *trident* is a three-pronged spear used for spear fishing. It finds prominent mention in Hindu, Greek and Roman mythology. A trident (Fig. 9A) is the weapon of Poseidon (or Neptune), the Greek God of the Sea. A similar weapon with rounded, bladed prongs called 'Trishoola' (Fig. 9B) is the weapon of several Hindu deities, including the *Shiva*, *Durga* and *Kali*.

'Trident hand' is used to describe the clinicoradiological appearance of the hand in a common form of rhizomelic dwarfism called achondroplasia.¹⁸ The index, middle and ring fingers are short and stubby, almost equal in length, with a characteristic gap between the middle and ring fingers,

resembling the Poseidon's trident (Fig. 9C).¹⁸ The little finger compounds the appearance on clinical or roentgenographic examination, but the appearance can be strikingly similar to a trident on a prenatal ultrasound (Fig. 9D).

'Trident acetabulum' (not to be confused with *Trident* acetabular shell in a total hip arthroplasty system by Stryker) is a characteristic appearance of the acetabulum seen in severe skeletal dysplasias like Jeune syndrome (or asphyxiating thoracic dysplasia), thanatophoric dysplasia and chondroectodermal dysplasia.¹⁹ The acetabular roofs are flat with downward spike-like projections at the medial, lateral and sometimes central aspect of the acetabular roof, giving a triradiate appearance resembling a trident (Fig. 9E).

3.3. Halberd

A *halberd* (also spelt as 'halbard') is a two-handed pole weapon which looks like a combination of a spear with an axe. It consists of a 5–6 feet long staff, with an elongated spiked head, an axe blade, balanced with a hook-like pick (Fig. 10A). It was an important weapon in middle Europe through the 14th to the 16th centuries, used by foot soldiers or peasants to contend with armoured men on horseback. The halberd has been used as a court bodyguard weapon for centuries and is still the ceremonial weapon of the Swiss Guard in the Vatican.

Fig. 9. (A) Poseidon's trident. (B) 'Trishoola', a type of trident. (C) Trident hand. (D) Appearance of a trident hand on prenatal ultrasound. (E) Trident acetabulum.

'Halberd-shaped pelvis' is a characteristic feature of a severe spondyloepimetaphyseal dysplasia called metatropic dysplasia.²⁰ The pelvis has a unique radiological appearance (Fig. 10B) due to hypoplastic iliac bodies with small sacrosclastic notches, horizontal acetabular roofs with a notch above the lateral margin of the acetabulum and markedly flared crescent-shaped iliac wings.

3.4. Nightstick

A *nightstick* is a type of club made of wood, rubber, plastic or metal, carried for forced compliance and self-defence by police or security personnel. The New York City Police Department used to use two kinds of batons (truncheons) – a short 11 inch one for daytime and a long 26 inch one for extra protection at night.²¹ The

Fig. 10. (A) Halberd, an axe-like weapon. (B) Halberd pelvis.

Fig. 11. (A) Nightstick, a type of club used by policemen. (B) Nightstick fracture of ulna.

former was called a *daystick*, while the latter came to be known as a *nightstick*. A nightstick usually had a short handle (Fig. 11A) at the side, which gave greater versatility to the user for defence against blunt or sharp weapons.

'Nightstick fractures' are isolated fractures of the ulna (Fig. 11B), commonly resulting from a direct blow by a policeman's baton, in an attempt to ward off an overhead blow using the ulnar border of forearm. These frequently result in delayed union or non-union with conservative management in a cast and currently, they are usually fixed internally with a plate for a better outcome.

3.5. Saber

A saber (also spelt as 'sabre') is a type of backsword with a single-edged, curved blade (Fig. 12A) in use since the early medieval periods. The saber saw extensive military use in the early 19th century when horse cavalry was the norm. Thereafter, it was gradually relegated to the status of a ceremonial weapon.

'Saber shin' refers to anterior bowing of tibia with a sharp edge (Fig. 12B), seen in congenital/tertiary syphilis, or rarely Paget's disease and vitamin D deficiency.¹⁵ The pathogenesis involves a massive, reactive periostitis of the anteromedial surface of tibia in

Fig. 12. (A) Saber, a type of sword. (B) Saber shin.

Table 1
Musculoskeletal colloquialisms based on arms and weapons.

S. No.	Colloquialism	Clinical/radiological	Cause/condition	Description
1.	'Gun barrel' sign	Radiological	Hammer/claw toes or mallet toes	End-on view of proximal or distal phalanx of the toe on an AP X-ray of the foot (Fig. 2A)
2.	'Double-barrel' fibular graft	Both	Configuration of vascularised fibular graft	A vascularised fibular graft osteotomised at the middle, and folded back on its periosteal hinge (Fig. 2B)
3.	'Trigger' digit	Clinical	Nodular hypertrophy of finger tendons	Trapping of tendon nodule at an annulus causes a sudden jerk/catch upon moving the tendon (Fig. 2C)
4.	'Gunstock' deformity	Both	Cubitus varus	Reversed carrying angle between the arm and forearm in cubitus varus (Fig. 3A)
5.	'Pistol-grip' deformity	Radiological	Cam-type femoro-acetabular impingement	The decreased offset between the femoral head and neck produces an appearance of inverted pistol-grip on an AP X-ray of hip (Fig. 3C)
6.	'Bullet-shaped' vertebrae	Radiological	Mucopolysaccharidoses, achondroplasia	Flattened vertebral bodies with anterior wedging and an anterior spike-like projection, on a lateral X-ray of dorsolumbar spine (Fig. 4B)
7.	'Bowling' fractures	Radiological	A type of fracture in children	Plastic deformation of bones (Fig. 5A)
8.	'Bow legs'	Both	Genu varum	Outward bending of knees in genu varum (Fig. 5B)
9.	'Bowstringing' of tendons	Clinical	Rupture of an annular pulley of flexor tendon of digits	The tendon moves away from the joint, appearing taut and prominent (Fig. 5D)
10.	'Bowstring' sign	Clinical	Lumbar disc herniation	Compression of tibial nerve in popliteal fossa reproduces pain, after root tension is relieved by knee flexion, in a positive straight leg raise (SLR) test (Fig. 5E)
11.	'Cannonball' metastases	Radiological	Pulmonary metastases	Well circumscribed, medium-to-large, round opacities in chest X-ray/CT scan (Fig. 6)
12.	'Dagger' sign	Radiological	Ankylosing spondylitis	A central radiodense line appearing in AP X-rays of dorsal/lumbar spine (Fig. 7B)
13.	'Bayonet' reduction	Radiological	Position of bone ends after reduction of a fracture	Complete off-ending of fracture ends, with a variable overlap (Fig. 8B)
14.	'Bayonet' deformity	Both	Madelung deformity	Volar displacement of the carpus and the hand, due to volar inclination of the distal radius (Fig. 8C)
15.	'Bayonet' sign	Clinical	Torsional malalignment syndrome	Zig-zag configuration formed by the quadriceps tendon, patellar tendon and tibial shaft (Fig. 8D)
16.	'Trident' hand	Both	Achondroplasia	Short, equal, divergent index, middle and long fingers (Fig. 9C and D)
17.	'Trident' acetabulum	Radiological	Asphyxiating thoracic dysplasia	Flat acetabular roofs with two to three downward spike-like projections (Fig. 9E)
18.	'Halberd' pelvis	Radiological	Metatropic dysplasia	Crescent-shaped iliac wings, with hypoplastic bodies and small sacrosciatic notches (Fig. 10B)
19.	'Nightstick' fractures	Both	Isolated fractures of ulnar shaft	Fracture caused in an attempt to ward off an overhead blow by a policeman's stick (Fig. 11B)
20.	'Saber' shin	Both	Congenital or tertiary syphilis	Anterior bowing of tibia with a sharp anterior border (Fig. 12B)

acquired syphilis, with no alteration in the direction of the medullary cavity, more appropriately called a pseudo-bowing. The saber shin deformity of congenital syphilis is associated with true bowing of the tibia.²²

4. Discussion

Eponyms, acronyms and colloquialisms commonly form a part of medical vocabulary and provide different kinds of information. An *eponym* is named after the individual who first described the sign or condition in detail, though it is controversial at times. Several eponyms are commonplace in musculoskeletal medicine like Perthes disease, Ewing sarcoma, Thomas test and Salter osteotomy. Though an eponym gives information on a useful piece of history, it does not aid in understanding the condition or sign by itself. There is a debate on the relevance of eponyms in medicine, with a view to abandon these altogether.²³ On the other hand, a *colloquial* term is based on the pattern of appearance or mechanism of a complex test, disease or radiological sign, drawing analogy to a common object. Colloquialisms are easier to correlate and remember, and add useful insight into the condition being described in a concise and interesting manner.

Musculoskeletal colloquialisms are named on a large range of objects from day-to-day life, like foods and drinks ('champagne glass' pelvis, 'popcorn' calcifications), clothes and accessories (pannus, 'collar stud' abscess), birds and animals ('elephant foot' non-union, 'swan neck' deformity), household items ('rocker

bottom' foot, 'drawer' sign), tools ('scissors' gait, 'hatchet' shoulder), and arms and weapons (Table 1).

Medicine, particularly orthopaedics, has been closely associated with wars and weapons. The wars provide an immense opportunity to learn, and the major wars of the last century have provided significant contributions to orthopaedics, particularly in fields of wound management, treatment of open fractures and reconstruction of hand injuries. The imagery of war has permeated throughout the orthopaedic literature with a large number of colloquialisms based on wars, arms and weapons. Acquaintance with the external appearance of these weapons helps in understanding these colloquialisms, in turn, helping the surgeon to identify important musculoskeletal conditions.

5. Conclusion

We have reviewed several musculoskeletal colloquialisms based on arms and weapons, helpful in clinical and radiological diagnosis. Most of these have characteristic appearances resembling popular weapons and are easy to memorise, serving as a useful aid in the diagnosis and treatment of various musculoskeletal conditions.

Conflicts of interest

The author has none to declare.

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