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TREATMENT OF DISLOCATIONS AND FRACTURES OF THE JOINTS OF THE HIP IN ANCIENT ROMAN MILITARY HOSPITALS: 27BCE-476 CE

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ABSTRACT

Roman physicians and surgeons developed diagnostic and treatment protocols for dislocations and fractures of hip joints that were remarkably advanced for ancient times. **Methodology**: This study uses historiography and conceptual analysis to compare ancient and modern medical writings. **Results**: The diagnostic protocol involved gathering patients' subjective reports, recording physicians' objective findings, assessing those findings in relation to comparable cases, and creating and revising treatment plans based on outcomes. Treatment protocols included nonoperative care, surgery when needed for accompany wounds, and recovery through convalescence and physical therapy. **Conclusion**: Roman physicians and surgeons developed diagnostic and treatment protocols for dislocations and fractures of hip joints that were remarkably advanced for ancient times.

KEYWORDS: Orthopedics, Fractures, Dislocations, Hip Joints.

INTRODUCTION

Dislocation of the hip joint occurs with the physical displacement of the head of the femur from its normal location in the acetabulum. Dislocations often involve hip fractures, and wounds, during Roman warfare from lethal steel weapons. To treat hip dislocations and fractures, Roman physicians (medici) developed protocols, drawing on Egyptian and Greek medicine as well as their own experience. After Greece became a Roman province in 146 BCE and Egypt in 30 BCE, Roman medicine incorporated knowledge from both traditions. Medici used surgical instruments, including metal scalpels, bone drills, and bronze or steel levers. However, they did not repair fractured hip bones with implanted metal. Instead, they treated wounds associated with dislocations and fractures through noninvasive or surface-level methods (Aegineta 6.107).

Roman medicine included many specialties, but orthopedics was not among them. Orthopedic remedies were performed by surgeons (Medicus Chirurgus) who received advanced training at medical schools in Alexandria, Egypt, or at Cnidus and Cos in Greece. Like modern physicians, some ancient doctors chose to practice on specialized areas. Some specialized in preventing, diagnosing, and treating injuries to bones, joints, ligaments, tendons, and muscles. Most, Medici however, were generalists who treated wounds, dislocations, and fractures of the hip, knee, foot, shoulder, elbow, hand, and spine (Aegineta 1846a).

SCOPE AND METHOD

Although orthopedics and orthopedic surgery did not emerge as distinct specialties until the eighteenth century, Roman physicians between 27 BCE and 476 CE developed early approaches to diagnosing and treating musculoskeletal disorders. This study presents a conceptual analysis of writings by ancient and modern physicians and historians. Like modern orthopedists, Roman physicians used nonsurgical methods and, when severe wounds were involved, surgical treatment to manage orthopedic conditions. However, they did not develop arthroplasty for damaged joints. Modern diagnosis and treatment still rest on foundations laid in antiquity, even though contemporary techniques and technology have advanced dramatically since antiquity. (Dutton 2025).

Primary Sources

Aulus Cornelius Celsus (first century CE) devoted a chapter of his medical work to fractures. Pedanius Dioscorides (40–80 CE) compiled an extensive catalog of drugs and other medicinal materials (2005). Claudius Galen wrote extensively on these subjects (2011), and Paulus Aegineta (1846a) compiled a seven-book medical encyclopedia that discusses the treatment of hip dislocations, and fractures in detail. Flavius Renatus Vegetius (fourth century CE) included a chapter on the physical fitness and mental acuity required for service in the Roman legions (1993). Quintus Martialis (third century CE) specialized in dietetics and emphasized the role of nutrition in treating disease. Scribonius Largus (first century CE) compiled 271 prescriptions and recognized the connection between dietetics and convalescence.

DIAGNOSIS OF HIP-JOINT DISLOCATIONS AND FRACTURES

The Roman protocol for evaluating hip-joint dislocations and fractures included seven steps:

1. Subjective information from the patient, if the patient was awake and coherent: Severe pain, rigidity, and loss of function characterize this condition. The patient might also be in shock.

2. Objective findings of the medicus included: The person had great difficulty in straightening the hip and leg. The knee on the injured side resistantly points inward toward the other knee. The dislocation is always accompanied by pain. The physician used skillful manipulation in determining the direction of the dislocation.

3. Diagnosis by the primary physician in consultation with other medici and healthcare personnel. If the dislocation of the hip is backward, the condition is characterized by an inward rotation of the thigh, with flexion, inversion, adduction, and shortening; pain and tenderness; and a loss of function and immobility. If the dislocation of the hip is forward, this indicates a dislocation through the obturator foramen, on the pubis, in the perineum, or through a fractured acetabulum.

4. Treatment of hip-joint dislocations and fractures relied on noninvasive or surface-level techniques. Medici placed the patient on a large frame or support. They also placed a large pad or pillow under the knee of the affected side. If the hip dislocation is backward the patient was anesthetized and laid in the dorsal position with the leg flexed on the thigh, and the latter on the abdomen. They then adducted and rotated the thigh outward. The medical staff performed circumduction outwardly across the abdomen, and back to the straight position. They sometimes used traction in this procedure. If the hip dislocation was downward, the medical staff treated the condition with traction in the fixed position, followed by outward rotation and extension. If the hip dislocation was forward, the medical staff used hyperextension and direct traction, followed by flexion, abduction, with inward rotations and adduction.

5. Monitoring and evaluating the safety and effectiveness of the treatment plan. Shock, bleeding pain, and infection were major considerations.

6. Revising the treatment plan as needed.
7. Convalescence (Celsus 1831).

TREATMENT OF HIP-JOINT DISLOCATIONS

Roman medici believed that a dislocated joint should be mechanically separated and, when possible, returned to its proper position. They sometimes used devices such as wooden bars to provide the leverage needed to realign the head of the femur from its normal location in the acetabulum. The knee and leg were wrapped firmly with linen bandages soaked in cerate—a mixture of olive oil and beeswax—to stiffen and stabilize the joint. Wooden splints were then secured over the bandages for added support, and the patient remained on bed rest with the legs elevated on pillows in case of shock. (Celsus 1831).

Hip dislocations accompanied by an open wound required special care. Roman physicians applied mashed comfrey (Symphytum officinale) roots and leaves to broken bones, torn ligaments, and severe cuts. Because comfrey contains allantoin, which promotes cell regeneration, patients also drank comfrey tea to treat internal bleeding. (Dioscorides 4.10). In Roman warfare, wounds often occurred together with dislocated or fractured joints. Such cases usually required surgery in Roman military hospitals, where surgeons (medici chirurgi) followed a systematic operative approach (Celsus 1831). AEgineta wrote: In all kinds of dislocation, the reduction may be accomplished by rotating it, by bending of the limb, and by extension." (AEgineta 6.118).

TREATMENT OF HIP-JOINT FRACTURES

The most common kind of hip-joint fractures is the neck of the femur. (Thomas 902). The Medici treated fractured hips non-operatively, as arthroplasty was beyond their scope of knowledge. Depending on the location and extent of the damage, some patients died, while others survived with a severe limp. Roman doctors used traction and manipulation and manually pulled the leg to realign the bones and relieve pain, sometimes using weights to keep the limb extended while it healed. Surgeons used bone levers (vectes) made of steel, wood, or reeds padded with linen. To make a cast-like dressing the physicians dipped bandages in a mixture starch, flour honey or resins that hardened as it dried. Physicians prescribed opium (Papaver somniferum) or mandrake (Mandragora officinarium) in a draught of wine for pain. Henbane seeds (Hyoscyamus niger) combined with opium, in an ointment prepared with wool fat (lanolin) could be administered externally as a local anesthetic.[1] (Dioscorides 4.64.3, 4.75.4, 4.68.3.). In extreme pain, some musculoskeletal fractures or dislocations caused in

combat required a general anesthesia.[2] Roman Medici employed the dissociative (sedation) (twilight) method of anesthesia. The patient received a sedative, and analgesic in a draught of wine. The analgesic of choice was powdered opium or mandrake. (Dioscorides 2005). A common sedative was corn poppy8 (Papaver rhoeas)[3] (Dioscorides 2005).

Compression fractures are often non-displaced and treated conservatively with bed rest and the use of crutches.[4] (Dutton 1430). While these conservative methods successfully healed minor fractures or aligned femur fractures in some patients, displaced hip fractures, they often caused shortening of the leg, chronic lameness, or a permanent limp. (Dutton, 1430).

OPEN-WOUND FRACTURE

Treatment of knee-joint dislocations or fractures in conjunction with open wounds was difficult in ancient Rome. Celsus wrote: "such compound accidents in the hip-joint excite our apprehensions of a fatal consequence." (Celsus 8.25) Galen wrote: "if inflammation, hollowness, wound, and filthiness are present at the same time in the same place, it is necessary to cure the inflammation first." Arnica Montana contains extracts of arnica and sesquiterpene lactones, including helenalin which exert anti-inflammatory effects. Galen, 3.9. 221K). Often, two medici worked in concert on this condition, aided by a nurse (nutricem) and orderlies. One of the physicians, served as a wound specialist, and the other as a specialist in corrections of disorders involving locomotor structures of the body. The more experienced doctor served as lead physician. The nurse continually evaluated vital signs of the patient such as the rate of breathing, heart and pulse rates, size of the pupils, skin color, presence of fever, and all related symptoms. While one medici attempted to join dislocated or fractured joints, the other worked on the wound itself. If the wound exposed the fractured bones, such as a separation of the head of the femur from the acetabulum, the medicus joined them with the help of comfrey. They usually employed a stypsis like (Symphytum Bulbosum)[5] to help prevent bleeding. If the wound was not associated with dislocation the medicus would manually manipulate the femoral head back into the acetabulum with or without the help of a bone lever. Fractures with open wounds were especially dangerous. Shock, bleeding, inflammation, fever[6], and infection must be brought under control if the patient was to survive. Medici relied on prolonged bed rest, manual bone realignment, and immobilization using splints and bandages. They managed shock and bleeding by direct pressure, clamping, cauterization and securing the edges of the wound with fibulae (steel safety pins). The wound was closed with silk, linen or gut sutures. The medical boiled lint, all instruments and bandages in water prior to their use. The Medicus sponged the area with acetum, and applied a mixture of lint, honey and aloe vera.[7] Then he applied a plaster of barbarum or other suitable dressing.[8]

To immobilize the fracture and keep the poultice in place, they wrapped the wound in linen bandages soaked in cerate-a waxy mixture made with beeswax and olive oil. the lAEginata (6.122) wrote: Place anti-inflammatory and soothing applications to the wounds at the beginning of treatment. Medical staff elevated the affected extremity to minimize edema. Ice packs applied in gauze for 20 minutes at a time can help with inflammation and pain. After inflammation subsides, in circa seven to nine days, the Medicus dislocated and adhered the fractured bones in their proper place with the help of comfrey. The medical staff then placed two splints on either side of the knee, Celsus recommended: "it is possible for the separated parts of the fracture to be conglutinated and bound to each other… we ought to carry out distraction of the bones, either with our hands or with ligatures surrounding the pelvis." (Celsus 1831). Roman physicians utilized an early form of crutches consisting of a T-shaped or V-shaped wooden devices placed under the armpits. They also utilized rudimentary canes.

The Roman state sent disabled soldiers to veteran colonies (coloniae) across the empire. They received a percentage of a full retirement, a land grant, and work animals. If their injuries were severe enough to prevent work, they received state stipends. Severely disabled veterans, such as those with eburnation, received wheeled chairs (Sedan Chairs) and litters, on poles, carried by members of their family or other retired veterans. There were no self-propelling wheelchairs. (Galen, 6).

CONVALESCENCE

The foundation of convalescent care in ancient, Roman military hospitals was medical herbs, rest, appropriate exercise, proper diet, and sessions with a case manager, which could be a medicus or experienced nurse. Medical staff housed wounded and sick soldiers in separate wards (Celsus 1831). Once the initial bone-knitting phase passed, physicians used physical therapy, manipulation, massage, and gentle movements to prevent permanent muscle atrophy while the bones fully solidified. The patient received a diet rich in foods believed to reduce inflammation, including berries, fatty fish, peppers, mushrooms, and grapes. Roman doctors gave the patients a mixture of vinegar and plant ash to ingest extra minerals, particularly calcium, to structurally support bone remodeling from the inside. Patients with hip dislocations were given deictically approved meals. As recovery progressed, physicians prescribed ankle pumps, quad sets, glute sets, heel slides and hamstring sets. Proper bandaging and residual conditioning reduced swelling and helped the pelvis. The Roman medical staff used Willow Bark as a draught internally, and turmeric as an ointment to treat inflammation. (Dioscorides 2017). To prevent Decubital from forming the staff often moved the position of the patient. They employed a lotion of frankincense and turmeric for this purpose as well. Romans added gauze, boiled in water, then cooled and

added cinegar, and thenhoney to place inside pressure wounds. Sometimes, medici used surgery, to remove necrotic tissue from deep decubiti. (Dioscorides 2017).

The Medici used a mixture of alum and Oak Gaul as hemostatic agents. (Dioscorides 2107). The surgeon covered the residual limb with a rigid resin-and-wax dressing. After removing it, hospital staff washed the wound area daily with oil and water, rinsed and dried it gently, massaged the area, and checked for complications.

If the patient reported swelling, redness, excessive drainage, increased pain, rashes, blisters, or abrasions to the physician, he treated them as wounds. The staff-controlled fever by sponging the patient with cold water and giving them a draught containing powdered Salix. (Dioscorides 2017). The medici used plantain weed (Plantago major), which contained flavonoids which acted as a laxative. (Dioscorides 2017).

Once the edema subsided, they fitted a custom prosthesis. Romans developed prosthetic devices for the arms, hands, and lower legs, as required. (Galen 2011; Aegineta 1846a).

When a infirmed legionnaire was well enough to leave the hospital, he and his family were sent to one of the many coloniae across the Roman Empire.

These colonies granted land to retired and disabled veterans, who also received 12,000 sesterces in severance pay and tax-exempt plots of land.

Each colonia had an infirmary staffed by personnel trained to care for disabled veterans. (Sweetman 2011).

The coloniae also provided supportive communities where veterans could cope with the physical and psychological effects of wartime service (Dio 1917; Sweetman 2011).

CONCLUSION

Roman physicians and surgeons developed diagnostic and treatment protocols for dislocations and fractures of hip joints that were remarkably advanced for ancient times. The diagnostic protocol included: gathering subjective reports, observing objective signs, comparing findings with similar cases, developing a treatment plan, and revising that plan as needed. Treatment followed four broad stages: nonoperative care, surgery, when necessary, convalescence, and physical therapy, extensive bed rest and phytotherapy.

Although these protocols resemble modern practice, today's orthopedists use diagnostic and treatment technologies unavailable to the Romans.

Modern diagnostic tools include the manometer, X-rays, computed tomography (CT), magnetic resonance imaging (MRI), and other volumetric imaging methods. Galen describes some of the instruments used by Roman physicians (Galen 2011).

Common instruments in modern orthopedic surgery include Hohmann retractors, tenolysis instruments, wound VAC systems, self-retaining retractors, elevators, drum dermatomes, extraction tools, and K-wire and pin instruments (Dutton 2025). Roman physicians employed (1) nonoperative procedures, (2) surgical procedures, (3) convalescence, and (4) physical therapy. Modern orthopedists also rely on diagnostic and treatment technologies the Romans did not have. Examples of modern diagnostic tools include the manometer, X-rays, computed tomography (CT), magnetic resonance imaging (MRI), and other volumetric imaging methods. Galen describes some of the instruments used by Roman physicians (Galen 2011). Common modern orthopedic instruments include Hohmann retractors, tenolysis instruments, wound VAC systems, self-retaining retractors, elevators, drum dermatomes, extraction tools, and K-wire and pin instruments (Dutton 2025).

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