The Hindfoot in Orthopedics, History, and Mythology

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ABSTRACT
The hindfoot is an anatomical region whose significance extends beyond the strictly medical sphere and is linked to ancient Greek tradition and certain milestones in human history. The well-known stories of Oedipus, Achilles, and the history of the ordeal of crucifixion are analyzed, revisited, and reinterpreted from the perspective of our medical specialty. In all of them, fate emerges as an inescapable guiding principle.
Keywords: Hindfoot; mythology; history.
Level of Evidence: V

El retropié entre la ortopedia, la historia y la mitología

RESUMEN
El retropié es una región anatómica cuyo interés trasciende lo estrictamente médico y se vincula con la tradición griega antigua y ciertos hitos de la historia de la humanidad. Los relatos célebres de Edipo, Aquiles y la historia del tormento de la crucifixión se analizan, actualizan y reinterpretan en relación con nuestra especialidad médica. En todos ellos, el destino aparece como un principio rector ineludible.
Palabras clave: Retropié; mitología; historia.
Nivel de Evidencia: V

The hindfoot is the anatomical region located posterior to the Chopart joint and comprises the talus, calcaneus, subtalar joint, capsuloligamentous structures, tendon insertions, the origins of the intrinsic foot muscles, and the surrounding soft tissues.[1] In addition to its medical significance, this structure is linked to traditions of ancient Greek mythology and significant milestones in human history.

I. The Pythia of the Oracle of Delphi in Greece—the *omphalos*, or navel of the world created by Zeus—had warned Laius, king of Thebes: "The son you have with Jocasta will be your murderer; he will sleep in your bed and shed your blood." Parricide followed by incest with his mother. A curse hung over Laius for having raped and driven to suicide Chrysippus, son of the king of Pisa, thereby breaking the bond of brotherhood that united them. But on a Dionysian night, Jocasta conceived. According to Sophocles in *Oedipus Rex*, after the child was born, Laius ordered his servants to hang him by his feet from a tree on Mount Cithaeron, but not before piercing his ankles or heels with a fibula (an ancient brooch or clasp). The resulting swelling would give rise to the child's name: *Oidema podós*, or Oedipus, meaning "swollen-footed," and would leave him permanently lame.[2-5] Nevertheless, the Fates decreed that the child would survive and be adopted by the rulers of Corinth. As an adolescent, Oedipus began to question his origins and decided to consult the Oracle of Delphi. In response, he received an enigmatic message: "Return to your origin" (Corinth or Thebes?). The young man interpreted this as Thebes, and on his way there, during a chance altercation with a group of men, he unwittingly killed his father. On the outskirts of the city, atop a hill overlooking an abyss, he confronted the Sphinx, solved its riddle, and, as a result, the monster plunged to its death. With the people freed and Oedipus hailed as a hero, he was eventually crowned king and married the widowed queen, with whom he had children, unaware that she was his mother. The double prophecy had been fulfilled.

However, as a series of misfortunes and plagues befell Thebes, Tiresias—the blind seer—and the oracle revealed

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the truth. Jocasta hanged herself, and Oedipus used the brooches from the queen's dress to gouge out his eyes so as not to face reality. He then expiated his guilt until his death in a forest or in battle. Over the centuries, his story persisted in Western culture, giving rise to countless interpretations in theater, philosophy, the visual arts, and psychology.[2,3,5] The Oedipus and Jocasta complexes would emerge. [3,5,6] Homer refers to Oedipus in both the *Iliad* and the *Odyssey*; for Aristotle, *Oedipus Rex* was the most accomplished Greek tragedy, and its influence extended to Shakespeare's *Hamlet* and Melville's Captain Ahab in *Moby-Dick*. In painting and sculpture, depictions of Oedipus's feet can be seen in *The Rescue of the Infant Oedipus* (Salvator Rosa, 1663, The Royal Academy of Arts, London) and *The Infant Oedipus Revived by the Shepherd Phorbas* (Denis Antoine Chaudet, 1810–1818, Musée du Louvre, Paris).

II. According to various accounts, the sea nymph Thetis was destined to bear a son who would surpass his father in prowess. Consequently, no god wished to marry her. Instead, she wed Peleus, king of the Myrmidons of Phthia. From this union was born Achilles, known as the Pelides, the swift-footed one, or the fair-haired one. In an effort to make him invulnerable, his mother immersed him in the waters of the River Styx, the boundary between the world of the living and the Underworld. However, she failed to wet his heels, the only part of his body that remained human and therefore vulnerable. Achilles received from Chiron—the wise centaur—an outstanding education in both intellectual pursuits and the skills required for hunting wild animals. He later shared his military training with his inseparable friend and cousin Patroclus.[3] When the Trojan War began, Achilles commanded the Greek fleet and gained renown as the greatest warrior of all times. After Patroclus was killed by Hector, Achilles took revenge by slaying the Trojan prince in combat and dragging his corpse behind his chariot before the walls of Troy, to the horror of his family and fellow citizens.[7] He subsequently killed Penthesilea, queen of the Amazons, Memnon, the Ethiopian prince, and many other Trojans.[3] Yet an early death was the price imposed upon a life filled with passion and adventure. Deeply in love with Polyxena, one of the many daughters of the Trojan king and therefore sister of Hector, Paris, Troilus, Cassandra, Creusa, and others, Achilles, in a display of seduction and narcissism, revealed his story to her, including the vulnerability of his heel. The young woman, who profoundly despised Achilles, entrusted the secret to Paris. When hostilities resumed in the spring, Paris, aided by Apollo, drew his bow and released a poisoned arrow that pierced the right heel of the Pelides, causing his painful death. The ashes of Achilles, mixed with those of Patroclus, were placed in a golden urn buried on the promontory of Sigeum near the coast of the eastern Aegean Sea.[3] Centuries later, Alexander the Great would offer honors and libations after crossing the Dardanelles (Hellespont) on the eve of the Battle of the Granicus.[8] The *Iliad* concludes with the return of Hector's body to his father, Priam.[7] It does not recount the story of the Trojan Horse, the details of Achilles' death, or the flight of Aeneas.

III. Crucifixion was a method of execution that the Romans adopted from Carthage. It was characterized by prolonged agony leading to death and by public humiliation. It was inflicted upon slaves, criminals, foreigners, and rebels, but not upon Roman citizens, except in cases involving military deserters. This form of execution was employed by various Mediterranean peoples, including the Assyrians, Chaldeans, Babylonians, Persians, Phoenicians, Arabs, and the Macedonian Greeks of Alexander the Great. It was also practiced in Japan, where it was known as *haritsuke*, particularly as a means of persecuting and punishing Christians during the Edo (Tokugawa) shogunate period (1603–1867).[9] Of particular interest here is the method employed by the Romans. During the slave revolt led by Spartacus (73 BC), approximately 6,472 rebels were crucified along the embanked Via Appia between Rome and Capua (189 km).[9,10] Roman cohorts carried all the necessary components in prefabricated form on wagons, allowing them to perform crucifixions regardless of local terrain conditions.

The procedure began by digging a hole to secure the vertical post, or *crux*. The condemned person's wrists were then fixed to the transverse beam, or *patibulum*, using iron nails driven through the space between the radius and ulna. On some occasions, the upper limbs were secured with ropes instead. Once the body had been raised and the beams firmly assembled, the T-shaped cross, or *Crux Commissa*, was complete.

The condemned individual was positioned with the hips and knees flexed and the lower limbs slightly displaced laterally to facilitate simultaneous transfixion of both calcanei with a single nail driven into the upright post.[10,11] These positions apparently reduced the victim's ability to resist. Death resulted from exhaustion, neurogenic or hypovolemic shock, or embolism.[12] Prior to nailing, the condemned individual was scourged with wooden rods or a short whip (*flagrum*).[12] In 1968, an anthropological specimen belonging to a man aged 24-28 years was discovered at Giv'at ha-Mivtar, Ras el-Masaref, Jerusalem. The findings corroborated the previously described method and also revealed fractures of the leg bones, a practice deliberately carried out by the executioner to hasten death (*crurifragium*). The specimen consisted of a right calcaneus and a left sustentaculum tali, both pierced by a nail. Beneath the head of the nail, a fragment of *Pistacia* or *Acacia* wood was identified, apparently intended to prevent

slippage of the soft tissues; at the opposite end, olive wood corresponding to the vertical post was found.[13] Despite the widespread use of crucifixion throughout the Mediterranean world and the numerous historical, religious, and literary references to the practice, this represents the first anthropological and traumatological evidence dating to the first century CE, prior to the destruction of the Second Temple (70 CE). The scarcity of available specimens may be related to the common practice of reusing materials for other purposes, which limited the preservation of archaeological remains.[12] A subsequent osteological analysis of the Giv'at ha-Mivtar find demonstrated that both calcanei had been pierced independently by iron nails measuring 11.5 cm in length, entering through the lateral aspect of the bone, exiting medially, and ultimately penetrating the wooden post. The nail diameter was not reported. Computed tomography played a decisive role in resolving the questions raised by these approximately 2,000-year-old remains.[14] The second published case derives from an excavation conducted on the Po River plain at La Larda di Gavello, in the Veneto region of Italy, where the skeleton of a man approximately 30 years of age was discovered. A 9-mm perforation was identified in the right calcaneus, traversing the bone below the sustentaculum tali—a perimortem lesion highly suggestive of crucifixion.[12] The third and most recent discovery dates from 2017 and comes from Fenstanton, Cambridgeshire, England. It consists of a right calcaneus pierced by a corroded iron nail, with the specimen remarkably well preserved. The skeleton dates to the fourth century CE (Roman legions remained in Britain from AD 43 to AD 449).[15] In all the specimens described, the metal nail was oriented perpendicular to the anteroposterior axis of the calcaneus. In certain populations, hindfoot bones have also been used for sex estimation.[16] Crucifixion was abolished in Rome during the fourth century CE by order of Constantine and was definitively suppressed by Theodosius I. Thousands of people were crucified in antiquity; however, one of them is regarded—alongside Moses and Muhammad, central figures of the Abrahamic religions—as having had a profound impact on the history of the Western world: Jesus of Nazareth, or *Yeshu Ha-Notzri*, who was crucified by order of the Roman prefect Pontius Pilate under the rule of Tiberius and died at Golgotha, outside Jerusalem, around AD 30-33.[17–19] According to Saramago, a painful and, if possible, ignominious death is always fitting for a martyr.[11] In the vast and diverse repertoire of the visual arts, considerable variation can be observed in the depiction of the fixation of Jesus Christ's feet, in contrast to recently discovered anthropological evidence.

In Islam, crucifixion was regarded as an exceptional punishment reserved—following judicial proceedings—for crimes classified as *ḥirāba* (armed aggression or warfare against the community of believers) or for serious acts of corruption, in accordance with Sura 5:33.[20]

CONCLUSIONS

The stories evoked in this article share essential features: the wounding of the hindfoot, persistence through time, reinterpretation in each era, and the inescapable and tragic nature of their protagonists' destinies. In *Tadeo Isidoro Cruz*, Jorge Luis Borges wrote: "Any destiny at all, however long and complicated, in reality consists of a single moment—the moment in which a man once and for all knows who he is."[21]

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