ARCHIVES OF HELLENIC MEDICINE: ISSN 11-05-3992

CLINICAL CASE
ΚΛΙΝΙΚΗ ΠΕΡΙΠΤΩΣΗ

ARCHIVES OF HELLENIC MEDICINE 2020, 37(Suppl 2):192–196
ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2020, 37(Συμπλ 2):192–196

Nephro-urology in Greek-Roman medicine
A solid catheter from the Lisbon National Museum of Archaeology

M.D.S. Barroso

Department of History of Medicine, Portuguese Medical Association, Lisbon, Portugal

Νεφρο-ουρολογία στην ελληνορωμαϊκή Ιατρική. Ένας συμπαγής καθετήρας από το Εθνικό Αρχαιολογικό Μουσείο της Λισαβόνας

Περίληψη στο τέλος του άρθρου

This paper discusses a solid thin catheter-shaped tube of copper alloy ending in a small scoop, found during the excavations of a Roman salting factory in the beautiful archaeological site of Troia by the sea, in the peninsula of Setubal near Lisbon. The finding shares similarities with the published hollow Roman catheters, being compared with the items. Its function was described in the medical literature on the urologic procedures and studies on Greek-Roman instruments, the finding fitting into the typology of instruments for unclogging the bladder neck from a stone blocking the passage of urine and combining the function of the ear probes, probes and catheters described in the literature for this purpose. A second similar device, in poor condition, presenting a broken end and bent in its distal part was found in the same archaeological site. These findings indicate a high prevalence of urinary lithiasis, induced by a diet rich in fish, shellfish and garum, itself used as a medicine, but containing a high amount of purines.

Key words

Catheters
Greek-roman surgical instruments
History of nephrology
History of urology
Urinary lithiasis

1. INTRODUCTION

Troia, an archaeological site facing the city of Setubal near Lisbon, was a Roman settlement from the 1st to the 5/6th cent. AD. The words Setubal and Troia share the same origin, deriving from the Latin word Cetobriga, as André de Resende (1500–1573), a Dominican friar, theologist and classicist, credited as being the first Portuguese archaeologist, reported: *"In ancient times it had flourished in the village of Cetobriga, which the inhabitants of the land call Troia"*.[1] The beauty of the ruins by the sea has attracted interest over time. However, there is still much to excavate and interpret. The main activities were fishing and the production of garum, a spiced sauce made of fermented fish, used as a condiment, and for medical uses:

"Of the therapeutic value of fish sauce, the ancient physicians, in general, are in agreement. In the treatment of internal conditions and diseases, fish sauce played an important role in the creation of medical foods administered by mouth or solutions injected as a clyster. The afflictions so remedied involved primarily the digestive tract".[2]

Alexander of Tralles (565–605 AD), one of the most prominent ancient physicians, correctly placed garum among the foods that should be avoided by patients suffering from "podagra" (gout): *"the patient should refrain from the following foods: pure wine, pork, veal and rabbit meat, and should beware of cabbage (Brassica oleracea L.), mustard, uncooked vegetables and watered garon and ensure good digestion"*.[3]

2. THE ARCHAEOLOGICAL SITE OF TROIA

During the 1st and 2nd centuries AD, salting factories produced large quantities of salted fish and fish sauces that were packed in amphorae, sold in the cities of Lusitania and exported mainly to Rome. The production was interrupted until the second half of the 2nd century. A new cycle encompassed the 3rd to the 5th century, when large factories were divided into smaller units. The diversified amphorae from that period suggest a greater variety of products, sardines being the main fish. The production of fish and salted products ceased in the first half of the 5th century, but the place continued to be occupied for at least another century. Evidence of numerous traces of salting factories with many tanks indicates that the Roman Troy was the largest centre for fish salting known in the Roman world. During the 5th and 6th century, salting factories slowly closed and the place was abandoned.[4]

The archaeological site comprises a housing area, baths, an incineration and cremation necropolis, a paleo-Christian basilica,

and industrial facilities. The houses formed blocks separated by alleys, some luxuriously decorated with mosaics and frescoes. The bath complex comprised an atrium, frigidarium, tepidarium and caldarium, hipocaustum, swimming pools, one of which decorated with mosaics, and exercise rooms. A large number of contiguous rectangular and square salting tanks were excavated near the baths.[5]

Medical-surgical instruments such as probes, spatula-probes, ear-probes, balsamaria were unearthed during the excavations. A solid tube of copper alloy shaped like a bladder catheter, ending in a small scoop, was found in the upper layer of rectangular salting workshop 22. A skeleton, a broken bone needle, two broken bone hairpins, a small bronze dish, a bronze nail, a hoop and an ear probe were found in workshop 22.[6]

Skeletons were found in some workshops that were used as tombs. In this case, it could well be the tomb of a physician. However, workshop 22 has not been interpreted as a tomb so far. The objects can be seen on the site of the National Museum of Archaeology.[7] Ana Patrícia Magalhães, the archaeologist who studied this factory, kindly conveyed her personal view concerning the probe which does not seem to have any relation with the skeleton. On the other hand, the reference to the skeleton does not indicate any tomb structure, so its type of deposition could indicate the burial of a slave, much more usual, and that would make sense given the area where it was found: a funerary space of an abandoned factory.

3. MANAGING URINARY LITHIASIS

In his work *"On Medicine"*, Caius Cornelius Celsus (25 BC–50 AD) described a large number of surgical operations performed for the first time in Western medicine. These included surgical management of urinary obstruction and bladder stone lithotomy, as a last resort when medical treatments failed. Celsus described some of these operations, probably with modifications. He described the operation of cutting for the stone into the bladder through the perineum as a hazardous procedure that should only be performed when there was no other option to relieve the patient. If the stone is large, he advised *"we must put over the upper part of it, the scoop must be rather long, for a short one has not enough strength to extract.*[8] The lithotomy scoops mentioned by Celsus have a straight shaft, the inner side of the scoop being rough to facilitate the adherence of the stone. These scoops are part of the ancient lithotomy instrumentarium. Ernst Künzl presented an example of this item.[9]

The existence of instruments devised explicitly for the procedure, such as special knives, hooks and hollow S-shaped catheters, adapted to the male urethra, is documented since the time of the Alexandrian physician Erasistratus (304–250 BC), and Pseudo-Galen, a variety of texts written in diverse periods inserted in the Galenic Corpus. In his text *"Introductio sive medicum"*, dealing with the medical management of urinary obstruction, Erasistratus praised the ability of the S-shaped catheter in emptying the bladder.[10] Celsus, referring to urinary catheterisation, advises an ear scoop to remove stones: *"Sometimes we are compelled to draw off the urine by hand when it is not passed naturally; either because in an old man the passage has collapsed, or because a stone or a blood-clot of some sort has formed an obstruction within it; but even a slight inflammation often prevents natural evacuation; and this treatment is needed not only for men but also sometimes for women. For this purpose, bronze tubes are made, and the surgeon must have three ready for males and two for females, in order that they may be suitable for everybody, large and small: those for males should be longest, fifteen finger-breadths in length, the medium twelve, the shortest nine; for females, the longest nine, the shortest six. They ought to be slightly curved, but more so for men, and they should be very smooth and neither too large nor too small".*[11]

Three Roman hollow catheters match Celsus' description (fig. 1).

According to Lawrence Bliquez, 15 male catheters and 2 female catheters have been found so far.[12] Celsus refers to the use of catheters in another condition: *"Sometimes too a stone slips into the urethra itself, and lodges not far from its orifice, because this becomes narrower further down. The stone should if possible be extracted either by an ear scoop or by the instrument with which a stone is drawn out in the course of lithotomy".*[13]

The Scottish surgeon John Stuart Milne, who carried

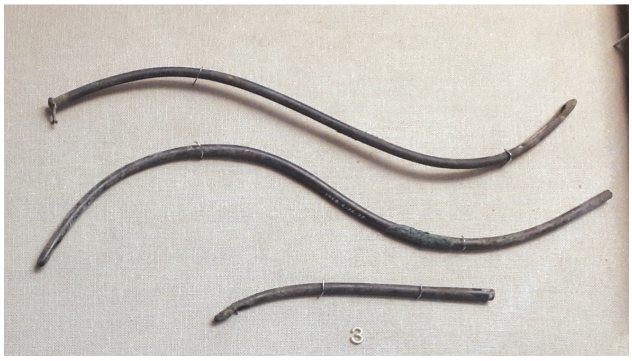

Figure 1. Roman catheters on display at the British museum. 1. and 2. Hollow male catheters. 3. Hollow female catheter. 1st century AD. Provenance: Italy. Credit: Wikimedia Commons file.

out the first throughout survey on Greek-Roman surgical instruments at the beginning of the 20th century, commented on this passage as follows: *"This shows that the scoop must have been quite a narrow instrument, or it could not have passed into the urethra"*.[14]

Milne questioned the existence of "solid bladder sounds" (instruments devised for probing and dilating passages within the body), some hints pointing to their use by Greek-Roman surgeons: "They must have been well aware of the characteristic grating sensation conveyed to the skilled hand on striking a stone with a metal instrument, for we have several references in the classics to a manoeuvre of pushing back by means of a catheter, a stone impacted in the urethra. […] Some instruments have come down to us, however, which seem undoubted solid bladder probes sounds.[15]

Milne gives the example of instrument no 3 on Plate XVI displaying catheters from the House of the Surgeon in Pompei (fig. 2).

Aretaeus of Cappadocia, a remarkable Greek physician from the 1st century BC, provides a similar description: *"But, if it is the impaction of calculi which stops the urine, we must push away the calculus and draw off the urine. With the instrument, the catheter, unless there be inflammations"*.[16]

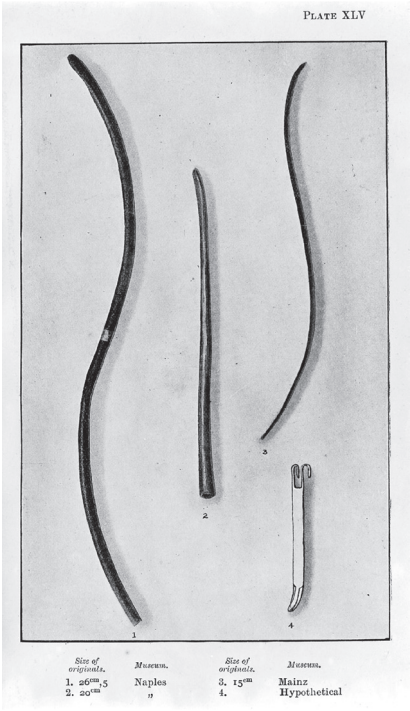

Figure 2. Milne JS. Surgical instruments in Greek and Roman times, Plate XVI.

Rufus of Ephesus (70–110 AD) refers to the manoeuvre when the physician did not want to perform the cutting operation: *"Si l'on ne veut pas recourir à l'incision pour les pierres engagés dans l'urètre, on doit les repousser avec la sonde"* (If we do not want to perform the incision when the stones are impacted in the ureter, we must push them with a probe).[17]

Caelius Aurelianus, a Roman physician from Sicca Venerea in Numidia, from c. 400 AD, provided information on the diagnostic use of a probe, a thin instrument that could be inserted through the urethra for the management of bladder obstruction: *"But, since the same symptoms occur in ulcerated bladder, stone of the bladder, and in cases of difficulty in urination due to the impediment of a blood clot, the suspicion that a stone has formed in the bladder will have to be corroborated by the use of a probe"*.[18]

Caelius Aurelianus reports having given details of the probe in his treatise "Answers". Unfortunately, the few extant manuscripts do not include the surgical part containing information on the probe.[19]

4. THE SOLID CATHETER FROM TROIA

The piece from Troia is a solid thin catheter-shaped tube of copper alloy ending in a small scoop. The distal end is broken (fig. 3).

Although with a less pronounced double curvature, it has a shape similar to the S-catheter introduced in Greek-Roman medicine by Erasistratus. Unlike catheters to void bladder urine, the device is thin and solid, ending in a small scoop, appearing to be devised to be introduced into the urethra to unclog stones from the bladder neck with the small scoop (fig. 4). Since the instrument is not well preserved, it is not possible to check the roughness of the inner side.

A similar piece was unearthed in the Troia excavations.

Figure 3. Solid catheter Inv. 983.47.19. Dimensions: length: 23.5 cm; thickness 0.12 cm. Credit: José Paulo Ruas (DGPC), National Museum of Archaeology.

Figure 4. Solid catheter. Detail of the scoop.

Figure 5. Ear probe. Inv. 983.288.21. Copper alloy. Length: 11.8 cm. Photo archive: Lisbon, National Museum of Archaeology.

It is in poor condition, presenting a bent shaft and broken distal end. Inv. 983.3.290. Dimensions: length: 17 cm, thickness: 0.23 cm.[7]

For this study, catheters from the collections of Greek-Roman instruments have been compared to the Troia solid tube, aiming to find its place and possible function, based on the writings of classical medical authors on urologic manoeuvres. Caelius Aurelianus refers to an easy manoeuvre, although probably just occasionally successful in women with impacted calculi in the urethra: "And women patients even insert their fingers into the vagina, and themselves remove the stone by gradually working it forward.[20]

Apart from these cases, the ancient authors described a lesser complicated and lesser dangerous manoeuvre than the stone cutting operation left for large stones, as Caelius Aurelianus stated: "Prescribe lithotomy in cases where a larger stone has been formed.[21]

They mostly refer to three types of instruments for carrying out a less troublesome procedure: a scoop, a catheter and a probe. The instrument from Troia finds the most similar parallelism in Milne´s solid catheter from the House of the Surgeon in Pompei. Nevertheless, this catheter does not end in a scoop. The instrument is similar to an ear probe from the Roman city of Balsa in Algarve, South of Portugal, in Algarve, also housed in the Lisbon National Museum of Archaeology, but it is shorter and has a straight shaft (fig. 5).[18]

The device from Troia seems to combine this kind of ear probe with a thin solid catheter, devised by a physician to match the function described by Celsus and the similar manoeuvres described by Caelius Aurelianus, Areteus of Cappadocia and Rufus of Ephesus. Physicians invented the instruments that they needed as Galen of Pergamon (130–210 AD) sadly highlighted after losing valuable goods, including books and wax models for surgical tools after a fire: *"Some, valuable for medical purposes, I said I had lost but still hoped to replace, but other instruments I had invented myself, making models out of wax before handing them over to the bronze-smiths"*.[22]

The finding of two similar catheter-shaped ear probes in a salting factory could indicate a high prevalence of urolithiasis, induced by a diet rich in fish, shellfish and garum, containing a high amount of purines. Uric acid stones are one of the four major types of kidney stones, together with calcium stones (calcium oxalate and calcium phosphate), struvite stones and cystine stones.[23]

5. CONCLUSIONS

The extant instruments and textbooks appear to contain sufficient evidence for an alternative theory to place this piece, discovered in the ruins of Troia and housed in the Lisbon National Archaeological Museum. In our view, it plays the role of three types of instruments for dislodging stones from the bladder neck: a scoop, a catheter and a probe, finding its place within the instrumentation of Greek-Roman nephro-urology.

ACKNOWLEDGEMENTS

We thank Ana Patrícia Magalhães, Master in Archaeology, for her competent and kind assistance in the interpretation of the context of workshop 22, the finding place of the solid catheter.

ΠΕΡΙΛΗΨΗ

Νεφρο-ουρολογία στην ελληνορωμαϊκή Ιατρική. Ένας συμπαγής καθετήρας από το Εθνικό Αρχαιολογικό Μουσείο της Λισαβόνας

M.D.S. BARROSO

Portuguese Medical Association, Department of History of Medicine, Lisbon, Πορτογαλία

Αρχεία Ελληνικής Ιατρικής 2020, 37(Συμπλ 2):192–196

Το παρόν άρθρο πραγματεύεται έναν συμπαγή λεπτό σωλήνα σε σχήμα καθετήρα από κράμα χαλκού που καταλήγει σε ένα μικρό κοχλιάριο, που βρέθηκε κατά τη διάρκεια των ανασκαφών ενός ρωμαϊκού εργοστασίου αλατιού στον όμορφο αρχαιολογικό χώρο της Τρόια, δίπλα στη θάλασσα, στη χερσόνησο του Setubal κοντά στη Λισαβόνα. Το εύρημα παρουσιάζει ομοιότητες με τους δημοσιευμένους κοίλους ρωμαϊκούς καθετήρες, οι οποίοι έχουν συγκριθεί με τα δημοσιευμένα αντικείμενα. Η λειτουργία του περιγράφηκε στην ιατρική βιβλιογραφία για τις ουρολογικές διαδικασίες και μελέτες για τα ελληνικο-ρωμαϊκά όργανα. Το όργανο ανήκει στην ομάδα οργάνων που χρησιμοποιούνται για την απόφραξη του αυχένα της ουροδόχου κύστης από μια πέτρα που εμποδίζει τη διέλευση ούρων και συνδυάζει τη λειτουργία των ανιχνευτών σημείων, ανιχνευτών και καθετήρων που περιγράφονται στη βιβλιογραφία για το σκοπό αυτό. Μια δεύτερη παρόμοια συσκευή, σε κακή κατάσταση, παρουσιάζοντας ένα σπασμένο άκρο και λυγισμένο στο περιφερικό τμήμα της, βρέθηκε στον ίδιο αρχαιολογικό χώρο. Αυτά τα ευρήματα υποδηλώνουν υψηλό επιπολασμό της λιθίασης του ουροποιητικού συστήματος, που προκαλείται από μια διατροφή πλούσια σε ψάρια, οστρακοειδή και γαύρο, η οποία χρησιμοποιείται ως φάρμακο, αλλά περιέχει μεγάλη ποσότητα πουρινών.

Λέξεις ευρετηρίου: Ελληνορωμαϊκά χειρουργικά εργαλεία, Ιστορία της Νεφρολογίας, Ιστορία της Ουρολογίας, Καθετήρες, Λιθίαση του ουροποιητικού συστήματος

References

1. RESENDE A. *De antiquitatibus Lusitaniae IV De Cetobriga.* Escudebat Martinus Burgensis academia typographus, Ebora, 1593 *(unpaginated)*
2. CURTIS IR. *Garum and salsamenta: Production and commerce in materia medica.* Brill, Leiden, 1991:31
3. PUSCHMANN T. *Alexander von Tralles.* Zweiter Band. Braumüller, Wien, 1879:572
4. PATRIMONIO PT. *Complexo industrial Romano de Salga e Conserva de Peixe em Tróia.* CIMAL, 2018. Available at: https://www.patrimonio.pt/post/2018/02/16/ complexo-industrial-romano-de-salga-e-conserva-de-peixe-em-tr%C3%B3ia
5. MENDONÇA I. *Povoado romano de Tróia/Ruínas de Tróia.* SIPA, 1992. Available at: http://www.monumentos.gov.pt/Site/APP_PagesUser/SIPA.aspx?id=3454
6. MAGALHÃES AP. Uma cetária de Troia escavada nos anos 50 do séc. XX, *Setubal Arqueológica* 2014, 15:245–258
7. http://www.matriznet.dgpc.pt/MatrizNet/Objectos/ObjectosConsultar.aspx?IdReg=145070
8. SPENCER WG. *Celsus: On Medicine – Books 7–8.* Volume III. Harvard University Press, Cambridge, 1938:425
9. KÜNZL E, KÜNZL S, HASSEL FJ. *Medizinische Instrumente aus Sepulkralfunden der römischen Kaiserzeit.* Rheinland Verlag, Köln, 1982, Figure 15, no 17, 18:47
10. KÜHN KG. *Claudii Galeni opera omnia.* C. Cnobloch, Lipsiae, 1827, vol. xiv:750-1
11. SPENCER WG. *Celsus: On Medicine – Books 7–8.* Volume III. Harvard University Press, Cambridge, 1938:427
12. BLIQUEZ LJ. *The tools of Asclepius: Surgical instruments in Greek and Roman times. Studies in ancient medicine, 43.* Brill, Leiden; Boston, 2015:223–224
13. SPENCER WG. *Celsus: On Medicine – Books 7–8.* Volume III. Harvard University Press, Cambridge, 1938:435
14. MILNE JS. *Surgical instruments in Greek and Roman times.* Clarendon Press, Oxford, 1907:145
15. MILNE JS. *Surgical instruments in Greek and Roman times.* Clarendon Press, Oxford, 1907:147
16. ADAMS F. *The extant works of Areteus, the Cappadocian.* The Sydenham Society, London, 1856:447
17. DAREMBERG C. *Oeuvres de Rufus d'Éphèse.* Imprimerie Nationale, Paris, 1879:50
18. DRABKIN IE. *Caelius Aurelianus. On acute diseases and on chronic diseases.* The University of Chicago Press, Chicago, 1950:957
19. ROSE V. Anecdota Graeca et Graecolatina. Mitteilungen aus Handschriften zur Geschichte der griechischen Wissenschaft. Zweites Heft. Dümmler's Verlagsbuchhandlung, Berlin, 1864:163–280
20. BARROSO MDS. Medicine, surgery, pharmacy, toilet and other health care tools from the Roman city of Balsa (Tavira, Portugal) from the 1st to the 3rd century AD. *O Arqueólogo Português* 2014–2015 V, 4/5:341–373
21. DRABKIN IE. *Caelius Aurelianus. On acute diseases and on chronic diseases.* The University of Chicago Press, Chicago, 1950:945–946
22. SINGER PN. *Galen: Psychological writings.* Cambridge University Press, Cambridge, 2013:79
23. CLEVELAND CLINIC. Uric acid stones. Available at: https://my.clevelandclinic.org/health/diseases/16378-uric-acid-stones

Corresponding author:

M.D.S. Barroso, R.P. Francisco Alvares, 27–5 Dto, 1500–477 Lisbon, Portugal
e-mail: msameirobarroso@gmail.com