A rare case of os paratrapezium

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SUMMARY

A rare case of an anatomical variant of the carpal bones, an os paratrapezium, is reported. Since Vesalius described the first wrist supernumerary bone in the sixteenth century, around 20 different accessory carpal bones have been identified; global references to them can be found in the literature, but previous references to the os paratrapezium are extremely scarce.

The case reported here is an incidental radiological finding, in a 69-year-old woman. After some clinical sessions and an intensive study of the available literature, any clinical, pathological, or other anatomical conditions were discarded, and the structure was identified as a paratrapezium, an accessory carpal ossicle.

A few more than twenty accessory carpal bones have been described in the literature, and its development and presence have been associated to a non-fused primary ossification centre. Occurrence of a paratrapezium within the accessory carpal bones has been reported as exceptional; however, as happens with all the carpal supernumerary ossicles, it is relevant to be aware of its existence, and to get an accurate analysis of wrist radiologic image findings to avoid both anatomical and clinical misdiagnosis.

Key words: Anatomical variants – Os paratrapezium – Carpal bones – Supernumerary carpal bones – Carpal ossicles

INTRODUCTION

Vesalius (1543) describes the first supernumerary carpal bone, later noted by Gruber (1870), and, since that, about 20 accessory bones have been described within the carpus, especially during the late nineteenth and early twentieth centuries; the opus by Bergman and colleagues (1996) review the extensive work by W. Gruber and W. Pfitzner.

Publications on carpal bone variability are above all about carpal bone coalitions (Gottschalk et al., 2016), but there are few papers about supernumerary bones. Among those scarce reports, most of the outstanding publications on supernumerary carpal bones are reviews with general descriptions and historical approaches to those pioneer nineteenth and twentieth centuries works (Bergman et al., 1996; Freyschmidt et al., 2003; Keats TE, Anderson 2013; Hayat and Loukas, 2016). Those studies reporting specific supernumerary bones mainly refer to the os centrale carpi, os styloideum, ossa epitriquetrum and hipotriquetrum, os triangularis, os hamuli propium, os radiale externum, and ossa epilunatum and hipolunatum (Bergman et al., 1996; Timins, 1999; Freyschmidt et al., 2003; Keats TE, Anderson 2013; Hayat and Loukas, 2016).

The remaining of the known accessory bones have exceptional literature reports, as is the case of the paratrapezium, that, to our knowledge,

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was firstly described by de Cuveland (1957), and lately referenced in a publication on the topic "carpal bones variations" (Freyschmidt et al., 2003). However, other relevant documents do not mention it (Timins, 1999; Hayat and Loukas, 2016), thus reinforcing the interest of this case report on this carpal os variant.

CASE REPORT

A 69 year-old woman admitted in the emergency department, University Hospital of Burgos (Spain), referred an accidental fall on the right hand; the physical exploration of her right forearm, wrist and hand evidenced pain and discreet functional impotence. During the follow-up, at the department of plastic and reconstructive surgery, the thenar eminence of her right hand looked elevated, but no acute inflammatory signs or redness were seen (Fig. 1A). The patient still showed discrete residual pain to the deep touch, but no alterations of the sensitivity, vascularization, or motility in the thumb axis were found. Within simple radiology exploration, a bone-like structure was identified in the volar side, beside, but independent of, both trapezius and first metacarpal base (Fig. 1B, C). To complete the study, a multi-slice helical CT was performed, and the image evidenced an oval shaped bone-like structure (axis measures 12x16x18 mm), with clearly definable cortical and trabecular bone, close to the palmar aspect of the trapezius and the base of the first metacarpal (Fig. 1D). To confirm the diagnosis, a biopsy of the structure was performed under local anaesthesia, and the anatomical pathology results yield an histologically well-defined bone with adjacent fibrous connective tissues, with no histological signs of malignancy; hence, differential diagnoses such as osteochondroma, accompanying ossicles from reactive rhizarthrosis, or fibrous periostitis were ruled out.

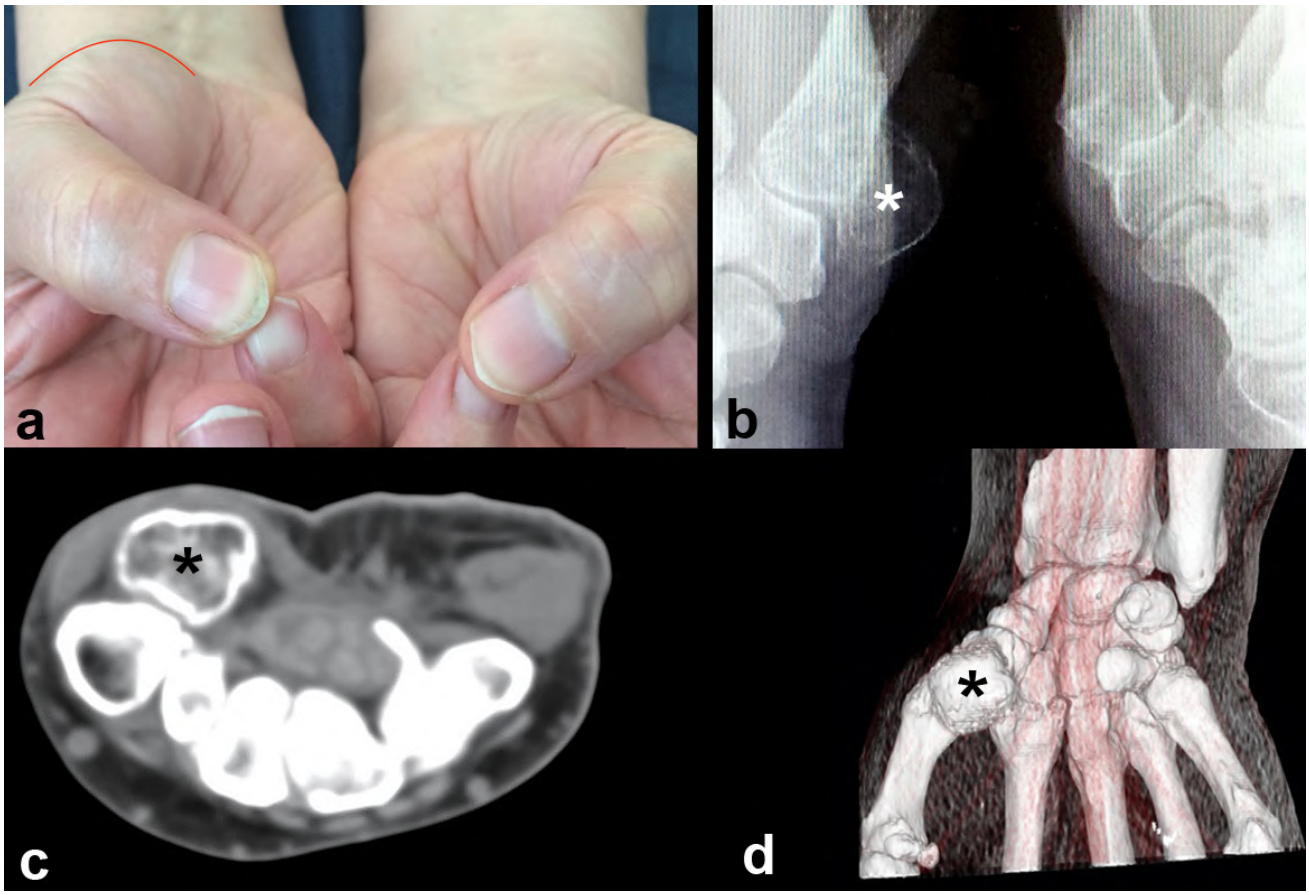

Fig. 1.- 1A. Image of both hands of the patient. On the right thenar eminence an elevation can be observed, the red line outlining it, corresponding to the subjacent bone-like structure presence. **1B.** Radiological image of the patient's right hand in oblique projection. The bone-like structure can be observed (white asterisk) anterior both to trapezium bone and the base of the first metacarpal. **1C.** Axial CT-scan section image. The bone-like structure is an isolated supernumerary formation (black asterisk) fully independent of the surrounding adjacent bones. **1D.** Three-dimensional CT-scan reconstruction showing the anterior surface of the supernumerary bone-like structure (black asterisk).

After discussing the radiological and histological results with the patient, it was decided to adopt a conservative treatment.

DISCUSSION

The case report describes the incidental finding of a supernumerary carpal bone.

Taking into account the bone position and relationships, together with the exhaustive review of the literature on the topic, the most feasible identification of the structure is a paratrapezium bone, a rare anatomical variation (de Cuveland, 1957; Freyschmidt et al., 2003). Supernumerary bone diagnosis usually follows incidental after traumatic antecedents leading to radiologic exploration (Timins, 1999; Freyschmidt et al., 2003; Hayat and Loukas, 2016), as is the case of this report.

Including the paratrapezium, to our knowledge firstly described by de Cuveland (1957), Freyschmidt and colleagues (2003) recognize five supernumerary ossa associated to the trapezium: lateral radial, epitrapezium, secondary trapezium, secondary trapezoideum, and paratrapezium.

During discussions on the case, the clinical history, as well as the evidence from image and histopathologic studies, lead to discarded pathological structures or conditions moving to identify the bone-like formation as a supernumerary carpal bone.

The patient's medical history related a left nephrectomy –in the early nineties- due to a pyelonephritis that was under control by the urology service until 2013, with normal clinical and analytical outcomes of the remaining kidney. Biochemical parameters, reviewed between 2011 and 2019, were normal, with the exception of an insignificant elevation in the levels of uric acid that did not need any medical treatment. Within the anamnesis, the patient denied having previously had gouty tophi, in any location, or having suffered previous trauma or pain at the right wrist.

Differential diagnoses ruled out by the anatomopathological results were calcification of soft tissue, bone or soft tissue tumour, such as osteochondroma, periosteal chondroma, reactive fibrous periostitis, or Nora's disease and accompanying ossicles of reactive rhizarthrosis. Osteochondroma in the carpus are rare, with twenty-one cases reported in the literature, and just two in the trapezium (Freyschmidt et al., 2003). Other very uncommon possibilities, in the context of genetic diseases affecting the bones of the hand, as Holt-Oram syndrome, Larsen syndrome, otopalatodigital syndrome, and hand-foot-uterus syndrome (Freyschmidt et al., 2003) can be rejected as, beyond the demonstrated normal bone histology, the anatomical variation presented herein is isolated, unilateral, and not associated to any other skeletal pathological condition of the patient.

The number of carpal bones can increase or decrease by processes related to ossification centres, thus resulting in anatomical variations (Bergman et al., 1996; Timmins, 1999; Freyschmidt et al., 2003; Gottschalk et al., 2016; Hayat and Loukas, 2016). Supernumerary bones can occur due to a lack of fusion of ossification centres (bipartite bones), whereas absence of carpal bones may be due to agenesis or hypoplasia, or fusion of ossification centres belonging to different adjacent bones (Timmins, 1999; Freyschmidt et al., 2003; Senecail et al., 2007; Gottschalk et al., 2016; Hayat and Loukas, 2016). Congenital origin of the supernumerary bones is a discussed matter (Freyschmidt et al., 2003; Senecail et al., 2007) and, in fact, only in central and triangular bones the congenital origin has been confirmed (Senecail et al., 2007).

Carpal supernumerary bones are known but rare. The *os vesalianum carpi*, a small bone at the lateral aspect of the carpus adjacent to the fifth metacarpal and hamate, first described by Vesalius (1543), was not reported again, more than three centuries later, until the pioneer work by Gruber (1870); its frequency has been reported of about 0.1% (Bergman et al., 1996). According to the *os vesalianum carpi* anecdote, radiologic series indicate general incidence of carpal supernumerary bones between 0.3% (Bogart, 1932) and 1.6% (O'Rahilly, 1953).

CONCLUSION

In conclusion, within radiologists, clinicians, and anatomists, it is relevant to be aware on supernumerary carpal bones, since they can have impact in differential diagnoses among various pathologies of the wrist.

Author contributions

MJRV: identification and follow up of the case, clinical data collection, and manuscript review. FJVC: anatomical data collection, manuscript writing, and final decision on the manuscript.

REFERENCES

BERGMAN RA, AFIFI AK, MIYAUCHI RM (1996) Illustrated Encyclopedia of Human Anatomic Variations: opus V: Skeletal System. URL: https://www.anatomyatlases.org/AnatomicVariants/SkeletalSystem/Regions/UpperLimb.shtml [accessed December 2020]

BOGART FB (1932) Variations of the bones of the writs. *Am J Roentgenol*, 32: 638-646.

DE CUVELAND E (1957) Über das Paratrapezium. *Arch Orthop Unfall-Chir*, 48(6): 722-724.

FREYSCHMIDT J, BROSSMANN J, WIENS J, STERNBERG A (2003) Upper extremity. The hand. Carpus (wrist). In: Freyschmidt J, Brossmann J, Wiens J, Sternberg A (editors). *Borderlands of the normal and early pathologic in skeletal radiography*. 5th ed. New York: Thieme, pp 132-137.

GOTTSCHALK MB, DANILEVICH M, GOTTSCHALK HP (2016) Carpal coalitions and metacarpal synostoses: A Review. *Hand (NY)*, 11(3): 271-277. doi: 10.1177/1558944715614860

GRUBER W (1870) Beiträge zu den secundären Handwurzelknöchen des Menschen. *Arch Anat Physiol Wissen Med*, 490-498.

HAYAT M, LOUKAS M (2016) Radius, ulna, carpals, metacarpals, and phalanges. In: Tubbs RS, Shoja MM, Loukas M (eds). *Bergman's Comprehensive Encyclopedia of Human Anatomic Variation*. New York: Wiley Blackwell, pp 68-75.

KEATS TE, ANDERSON MW (2013) The upper extremity. The carpals. In: Keats TE, Anderson MW (eds). Atlas of Normal Roentgen Variants That May Simulate Disease. Philadelphia: Elsevier Saunders, pp 414-453.

O'RAHILLY R (1953) A survey of carpal and tarsal anomalies. *J Bone Joint Surg Am*, 35: 626-642.

SENECAIL B, PERRUEZ H, COLIN D (2007) Variations numériques et synostoses congénitales des os du carpe. *Morphologie*, 91: 2-13.

TIMINS ME (1999) Osseous anatomic variants of the wrist: findings on MR imaging. *Am J Roentgenol*, 173(2): 339-344.

VESALIUS A (1543) De humanis corporis fabrica libri septem. Basilea: Ex officina Joannis Oporini, pp 115-119.