



Case Report

Carpal boss: An uncommon cause of dorsal wrist mass and chronic pain in children. A case report

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ABSTRACT

Pain referred to the wrist joint, is a common affection among the pediatric and adolescent population, either due to acute injury or chronic stress. Even though the most common cause of a wrist mass associated with chronic pain in this patient population is a ganglion cyst, other pathologies should also be considered. We report an uncommon case of a 10-year-old girl with a carpal boss that was treated with surgery after non-operative measures failed to achieve symptom resolution. The diagnosis was established based on clinical examination and imaging findings. Although rare in the skeletally immature population, carpal boss should be considered as a differential diagnosis in a pediatric-adolescent patient with a dorsal wrist mass and chronic pain. The purpose of the present study was to describe the presentation and anatomical findings in our patient, that differ from the cases reported to date, as well as to review treatment options of this condition in the pediatric population.

Keywords: Bone spur, Carpal bones, Child, Joint pain, Wrist injuries

INTRODUCTION

Among the pediatric and adolescent population, wrist pain is a common cause of consultation in orthopedics practice either due to acute injury or chronic stress.^[1] The most frequent cause of a wrist mass associated with chronic pain is a ganglion cyst.^[2] Pediatric ganglion cysts are usually found in the dorsal aspect of the wrist.^[3-5] Dorsal ganglions of the wrist tend to occur more proximally (arising from the scapholunate ligament), and have a cystic consistency.^[6] The differential diagnosis should also include lipoma, neuroma, neurofibroma, enchondroma, osteochondroma, and osteoid osteoma, subcutaneous calcification, giant cell tumor from the synovial tissue, and sarcoma.^[7] A carpal boss is an osseous mass more commonly located along the dorsal base of the second or third metacarpals, between the trapezoid and capitate. Although there are multiple theories about its etiology, such as degenerative causes or a post-traumatic complication, its actual incidence is yet unknown and most reported cases were in the adult population.^[7,8] There have been very few reports of pediatric patients with a symptomatic carpal boss that required surgical management.^[9-11]

We report an uncommon case of a 10-year-old girl with a symptomatic carpal boss, with an unusual anatomic presentation. The diagnosis was based on clinical and imaging findings. We

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also report the surgical technique used by the treating surgeon as conservative management failed in our case.

CASE REPORT

A 10-year-old girl was referred to our pediatric orthopedic department with a painful, solid protuberance on the dorsal aspect of her left hand [Figure 1]. The mass had been there for 12 months and had recently increased in size. In the beginning the pain was associated with physical activity (the patient was a gymnast) but it became noticeably worse and interfere with her daily activities despite being treated with immobilization, non-steroidal anti-inflammatory (NSAIDs) medication, and physiotherapy. There is no previous record of wrist or hand trauma. The physical exam demonstrated the presence of a firm mass on the dorsum of the hand at the base of the second and third metacarpals. The patient had a normal range of motion of the wrist, metacarpophalangeal and interphalangeal joints, and a normal neurovascular exam of the wrist and hand. Radiographs revealed a prominent carpal boss [Figure 2]. A computed tomography (CT) study revealed a bony prominence and reactive sclerosis at the index and middle carpometacarpal (CMC) joints [Figure 3]. Due to the persistence of the symptoms and no improvements after adequate conservative treatment, we offered the patient surgical resection of the carpal boss.

Surgical resection was performed through a transverse incision over the second and third CMC joints [Figure 4]. The extensor carpi radialis brevis tendon was retracted ulnarly, and the extensor carpi radialis longus tendon was retracted radially. The third CMC joint was exposed, revealing a large carpal boss from the capitate to the base of the third metacarpal. Then the second CMC joint was also exposed, demonstrating a mild carpal boss from the base of the second



Figure 1: 10-year-old girl with 12 months of the left wrist pain, and a firm mass at the dorsal surface of her wrist.

metacarpal to the trapezium. Both bony masses were excised using an osteotome until the second and third CMC joints were visualized. Both CMC joints were found to be stable under fluoroscopic examination with stress maneuvers.

Postoperatively, a short-arm cast was used for 2 weeks. Then, physiotherapy commenced after cast removal for a period of 4 weeks, consisting of restoring active range of motion and muscle strengthening. The patient's post-operative course was uneventful, and she reported complete improvement in left hand pain at her first follow-up visit. At the past follow-up (18 months after surgery), the patient was able to perform daily activities without pain.

DISCUSSION

There is still little information about carpal boss etiology and pathogenesis. The proposed causes include degenerative osteophyte formation, post-traumatic complications, CMC coalition, or an accessory ossicle termed the "os styloideum."^[12] Diagnosis is based on radiographs. The radiographic appearance is typical; but the overlapping of other bony structures may hinder an optimal visualization. A lateral view with 30° of supination and ulnar deviation of the wrist - "carpal boss view"-may improve visualization of the boss in comparison to a plain lateral radiograph.^[4,5] CT scan can help to delineate the presence of a bony protuberance along the dorsal base of the second or third metacarpal and/or the adjacent trapezoid and capitate bones.^[11]

Conservative management is the first line of treatment for a symptomatic carpal boss. It consists of activity modification,

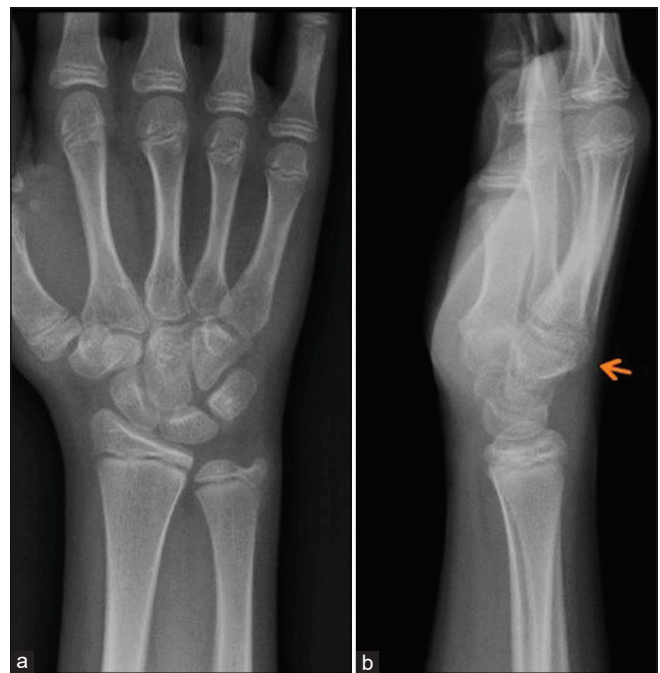


Figure 2: AP and lateral radiographs of the left wrist.



Figure 3: Sagittal and 3D CT-scan imaging that shows a dorsal protuberance at the base of the second and third metacarpal that connects with the trapezoid and capitate (arrows).

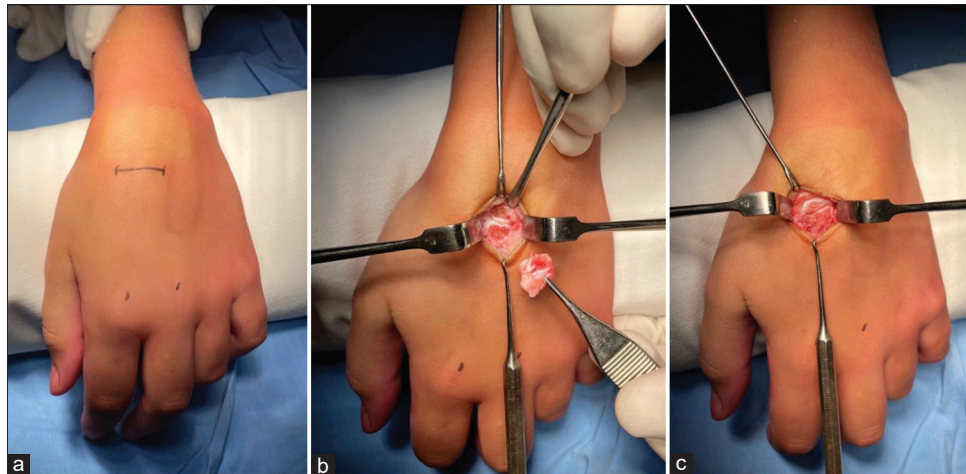


Figure 4: Intraoperative images. Transversal approach (left), resection of the carpal boss of the second metacarpal (center), and of the third metacarpal (right).

physical therapy, NSAIDs, immobilization, and corticosteroid injections. Most authors agree that symptomatic patients that fail conservative management require surgical treatment for pain relief. There is no consensus as to the best surgical approach. The two most common techniques consist of resection of the bony prominence or arthrodesis of the CMC joint. Cuono and Watson suggested excision of the carpal boss to normal joint cartilage level and normal cancellous bone to reduce the risk of recurrence.^[13] Although there are multiple adult case series with variable outcomes, pediatric reports on this condition are scarce.^[9-11] Kaniewska *et al.*^[11] presented a case of a 15-year-old male patient with carpal boss, successfully treated with a corticosteroid infiltration of the third CMC joint under fluoroscopy. Karmazyn and Siddiqui^[9] reported a case of a 12-year-old child with an os styloideum fused to the trapezoid. Capo *et al.*^[10] described

a case of a 15-year-old girl with a metacarpal boss that originated from the third metacarpal and fused into the capitate. Due to the patient's persistent pain, surgery was offered. The resection was carried out through a longitudinal approach over the third CMC joint. At 12 months after surgery, the patient had no pain, wrist range of motion was 70° of flexion, 60° of extension, and 180° pronation-supination arc, and was not limited in any way with her activities of daily living. Our case differed from the previous pediatric cases, as it describes a combined metacarpal boss emerging from the second and third metacarpals with impingement against the trapezoid and capitate, respectively. Furthermore, the transverse dorsal approach used in this case has not been previously described in this disorder. The transverse approach following Langer's lines provides the best exposure for combined second and third metacarpal

bosses and allows to preserve vascular structures as well as the overlying cutaneous nerve branches.^[14]

We report an uncommon case of a 10-year-old girl with a symptomatic carpal boss. To our knowledge, this is the youngest patient reported in the literature. Surgical resection provided pain relief and return to daily activities after failed conservative management. However, long-term follow-up is necessary to detect possible late complications such as boss recurrence or joint instability. Although rare in the skeletally immature population, carpal boss should be considered in the differential diagnosis of a pediatric or adolescent patient with a dorsal wrist mass and chronic pain.

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AUTHORS' CONTRIBUTIONS

JM conceived and designed the report, conducted research, provided research materials, and collected and organized data. FT analyzed and interpreted data. FT wrote the initial and final draft of the article and provided logistic support. All authors have critically reviewed and approved the final draft and are responsible for the manuscript's content and similarity index.

ETHICAL APPROVAL

The ethics committee of our institution has given its approval for the development and publication of these case report.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient's parents have given their consent for the patient's images and other clinical information to be reported in the journal. The parents understand that the patient's name and initials will not be published, and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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