



Osteonecrosis of the trapezium: a case report and review of the literature

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We describe the case of a 58-year-old woman with AVN of the left trapezium which was treated surgically. This paper aims to review the etiologies leading to the pathology and the different therapeutic options. Avascular necrosis (AVN) of the carpal bones most commonly involves the lunate and the scaphoid. AVN of the trapezium is extremely rare. To our knowledge only 3 cases have been published in the literature so far and they were all treated differently.

Keywords: Bone graft; osteonecrosis; trapezium.

INTRODUCTION

Avascular necrosis is the death of bone tissue due to a lack of blood supply. It rarely affects carpal bones (1) but when it occurs it mainly affects the lunate and the scaphoid. AVN of the trapezium is extremely rare with only 3 cases published in the literature (2-5).

The aim of this paper is to describe a case and do a review of the literature.

CASE REPORT

A 58 year-old-woman presents to the hand clinic with chronic left wrist pain. The patient is a right-handed orthopedic surgeon.

Her medical history is unremarkable except for an AVN of the hip treated conservatively 30 years ago. She does not take any medication nor corticosteroid and does not drink alcohol.

Three years ago she sustained a trauma of the left wrist resulting in a rupture of the ulnar carpal collateral ligament without associated fracture. The treatment was conservative.

The pain in her wrist started 4 month ago after a direct trauma. Radiographs done after the fall revealed no fracture. An echography was done and showed the increase in size of a known cyst of the flexor carpi radialis tendon. The pain was attributed to the cyst which was subsequently removed in another hospital 3 weeks after the trauma.

As the patient remained symptomatic with no improvement of the pain a CT-scanner was done and no abnormality was found.

A first MRI was done and revealed an edema of the trapezium (Fig 1). The patient was referred to us at that point.

The patient complains of intensifying pain in the first carpometacarpal joint radiating in the first and

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Figure 1. — Left wrist MRI: Coronal T2-weighted Fat Sat image showing a high signal intensity of the trapezium bone marrow, consistent with edema.



Figure 2. — Left wrist MRI: Coronal T1-weighted image showing a fragmentation of the trapezium.

second finger, interfering with her daily activities. The pain causes sleep disorders increasingly for the last weeks.

Physical examination showed a pain with wrist and thumb mobilization as well as decreased grip strength. Kapandji score was 10/10. The patient was initially treated with antebrachial cast immobilization for 3 weeks but remained symptomatic and showed no improvement of the pain. A follow-up MRI with contrast was done and revealed a fragmentation of the trapezium (Fig 2).

After collegial case discussion with the patient, we established a surgical indication.

A posterolateral approach over the trapezium was used to realize a curettage of the cancellous part of the bone, leaving the majority of cortex intact. A 1 cm³ cancellous bone graft of the distal radial metaphysis was taken to fill in the trapezium, followed by the suture of the articular capsule.

The patient had a commissural immobilization for 8 days.

Two weeks after the surgery the patient was pain free but decided to keep a protective splint until 2 month post operatively when she restarted her professional activity.

Twelve months after surgery the patient still feels discomfort in the first carpometacarpal but less intense and more localized than preoperatively. The control MRI shows an incorporated bone graft (Fig 3).

The grip strength is back to normal and the patient is satisfied with the surgery.

The residual pain is attributed to the existing carpometacarpal arthritis but has no impact on the patients daily activities.



Figure 3. — Left wrist MRI: Coronal T2-weighted Fat Sat image, showing no persistent signal abnormality of the trapezium's bone marrow, indicating an incorporated bone graft.

DISCUSSION

Avascular osteonecrosis is defined as the death of bone tissue due to a lack of blood supply. Risk factors associated with this condition are repeated trauma or microtrauma, alcohol, long term use of corticosteroids, hyperbarism, hemoglobinopathies and systemic disorders such as Gaucher's disease and systemic lupus erythematosus.

The probability of developing AVN is based on the type of vascularization of the bone (6).

Gelberman and Gross described the intraosseous vascularity of the carpal bones and divided them in three groups (7-9). The first group I, made of the scaphoid, the capitate and 8% of the lunate is, because of a large intraosseous surface depending on a single artery at greater risk of AVN.

The group 2, characterized by at least two areas of vessel entry but no intraosseous anastomosis is

composed of the trapezoid and the hamate. Finally the group 3, containing the trapezium, the pisiform, 92% of the lunate and the triquetrum in which the bones have intraosseous anastomosis and no large bone surface depending on a single vessel making AVN extremely rare.

The trapezium receives nutrient vessels from the radial recurrent artery through the deep palmar arch on its palmar surface and branches directly off the radial artery and its lateral, palmar and dorsal surfaces (8). On top of that, plenty of intraosseous anastomosis between the different vessels exist (6) making the trapezium the carpal bone with the richest blood supply (9).

In our case the AVN could have been caused either by the wrist cyst removal surgery or by a missed fracture caused by a direct trauma, two possible etiologies of AVN due to damages to the vascularization of the trapezium.

Gracia-Lopez et al described the case of a 26 year old woman with AVN of the trapezium treated with bone excision and suspension arthroplasty (3). Zafra et al described the case of a 20 year old male for whom a vascularized distal radius bone graft was performed (4). Finally, Petsadotis et al reported one case of AVN in a 38 year old male treated successfully by cast immobilization (5).

The table below compares the 3 cases published in the literature (Table I). The symptoms are nonspecific including pain and decreased range of motion.

MRI is the imaging exam of choice to diagnose AVN in early stages (10).

When AVN is diagnosed, we must look for other possible sites of osteonecrosis and especially femoral heads as in our case.

Treatment options for AVN of the trapezium range from a simple conservative treatment to a resection surgery and bone graft.

In our case, after inter specialist case discussion and because of the lack of guidelines we decided to do a bone graft with good evolution knowing that it would not contraindicate any eventual further surgery if needed.

The advantage of this technique is to avoid the complication of trapeziectomy and conserve the patient's grip strength.

Table I. — Comparison between the 3 cases found in the literature and the present case.

	Garcia-Lopez (2002)	Zafra (2004)	Petsatodis (2017)	Present case
Sex	female	male	male	female
Age	26	20	38	58
Complementary evaluation	X-ray, MRI	X-ray, MRI, scintigraphy	X-ray, MRI	X-ray, MRI
Etiology	High impact trauma	trauma	unknow	Trauma, surgery
Treatment	Trapeziectomy and suspension arthroplasty	Vascularized distal radius bone graft	6 weeks immobilization	Bone graft
Evolution	Good at 1 year	Good at 1 year	Good at 3 month	Good at 1 year
MRI= magnetic resonance imaging ; X-ray= radiography				

In the case of an unfortunate outcome arthroplasty or trapeziectomy are still possible.

CONCLUSION

Because of its rich vascularization AVN of the trapezium is extremely rare. To our knowledge only 3 cases have been published so far. The described treatment options range from a simple conservative treatment to more elaborate graft surgery, but none of the therapeutic solution has proven its superiority.

Consent: Informed consent was obtained from the patient for publication of this case report and accompanying images.

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