

## Original Article

# Lunate Intraosseous Ganglion Cysts and Chronic Wrist Pain— Reporting Six Cases

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## Abstract

**Background:** Intraosseous ganglion (IOG) cysts rarely have been reported in the carpal bones and lunate is the most common area of involvement. They can present as chronic wrist pain accompanied by a radiolucent lytic lesion in the lunate bone. We provided a retrospective review of six cases of intraosseous ganglion cysts within the lunate bones that all of the patients presented with chronic wrist pain.

**Methods:** We retrospectively reviewed the medical records, pathologic reports and imaging files of the six patients who were referred and treated due to chronic wrist pain with final diagnosis of the lunate intraosseous ganglion. All cases were treated by curettage and autologous cancellous bone grafting.

**Results:** There were six patients with final diagnosis of the lunate IOG who received surgical treatment. Four out of six patients were female and the remaining was male. Mean age of the patients was 33 years (22 – 56). Right wrist was involved in four patients. Pain was the chief complaint in all patients. Mean time of suffering from the wrist pain till referring to hand clinic for definite treatment was nine months (3 – 24). Mean duration of follow up was 30.6 months (6 – 48). The wrists became pain free after surgical treatment and no graft absorption or recurrences were seen in the control radiographs obtained throughout the follow-up period.

**Conclusion:** Diagnosis of intraosseous ganglion was based on the imaging features and clinical presentation. Although most cases of the lunate bone IOGs are symptom free and found incidentally after wrist imaging performed for other reasons, these lytic lesions should be included in differential diagnosis list of chronic wrist pain especially in the presence of increased uptake in bone scan located on the lunate area.

**Keywords:** Chronic wrist pain, intraosseous ganglion cyst, lunate, wrist

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## Introduction

Although intra-osseous ganglion (IOG) cysts are the most common bone tumors of the wrist carpal bones, their etiology is not clear yet.<sup>1</sup> They may originate directly from the carpal bones or less frequently result from the secondary penetration to the bones by nearby soft tissue ganglion cyst.<sup>2</sup> IOG is an infrequent cause of wrist pain.<sup>3</sup> Rarely they can present as chronic wrist pain accompanied by a radiolucent lytic lesion in the lunate bone.<sup>3</sup> In this study, we present six cases with final diagnosis of IOG within the lunate bone, their clinical presentations, imaging findings and results of treatment.

## Material and Methods

This study was approved by ethic board of our institution (Shafa Yahyeian Rehabilitation Center). Between 2005 and 2013, we treated six patients with chronic wrist pain and final diagnosis of the lunate intraosseous ganglion. We retrospectively reviewed the medical records, pathologic reports and imaging files of these patients.

Our indication for surgical intervention was chronic wrist pain

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in the presence of lunate cyst when we could not be able to find any other reasons for this chief complaint. We did not approach to the lunate cysts without increased uptake in their wrist bone scans. Prior to the surgery we tried a period of conservative treatments including non-steroid anti-inflammatory drugs (NSAIDs), immobilization of the wrist in short splint and physical therapy.

The surgical treatment was wrist arthrotomy through dorsal approach. After opening of a small round window by using fine drilling and small osteotome on dorsal pole of the lunate, curettage and bone grafting were performed. Bone graft was harvested either from the ipsilateral distal radius or contralateral iliac crest through a small incision. The wrist was immobilized in short arm cast for six to eight weeks when consolidated union was appeared in plain radiographs and patients were referred for physiotherapy after removing the cast to improve the range of motion.

## Results

We recruited six patients with final diagnosis of the lunate IOG who received surgical treatment. Four out of six patients were female. The mean age of patients was 33 years (22 – 56). In four patients, right hand and in the remaining two the left one was involved. Pain was the main complaint in all patients. The mean time of suffering from the wrist pain till referring to hand clinic for definite treatment was nine months (3 – 24). Mean duration of follow up was 30.6 months (6 – 48).

The pain in the involved wrist was more intense during physical activity. In physical examination of all cases we found tender-

ness on dorsal aspect of the wrist localized on the lunate bone and scapholunate area without any local swelling. Instability tests including Watson shift test were negative. Wrist dorsal extension was painful in its extreme. There was no co-existing soft tissue ganglion in physical examination of the involved wrists.

There was no preceding trauma or inflammatory diseases in the recent history of our patients and all routine laboratory tests including ESR and CRP were in normal range.

Wrist radiographs revealed lucent lytic lesion in the lunate bone with surrounding thin sclerotic rim (Figure 1). In five wrists the lytic lesion was eccentric, in another one it was centric. The eccentric lesions in three out of five were in the scaphoid side of lunate (Figure 1). No pathologic fracture or lunate collapse was observed in our cases. No osteoarthritis was detected in the involved wrist, using the plain radiographs.

We used CT scan, MRI and bone scan to evaluate the nature, location, activity and dimensions of the lunate bone lesion in all of our cases. CT scan was used to document the cystic nature of the lesion and localize its location in the lunate (Figure 2). Bone scans showed the increased uptake in the lunate area of all cases (Figure 3). MRI revealed hypointense in T1 weighted and hyperintense homogenous lesions in T2 weighted images in the lunates of all patients (Figure 4, 5).

After dorsal approach to the wrist and opening window, in four cases the cysts were filled by clear gelatinous material (Figure 6). An anatomic continuity of the IOG to the scapholunate joint was observed in three cases during approach and curettage. The obtained materials from the curettage were sent for histologic study. The result of pathologic examination was similar to that of soft tissue ganglions.

The wrists became pain free after surgical treatment and no graft absorption or recurrences were seen in the control radiographs obtained throughout the follow-up period.

## Discussion

Intraosseous ganglia are most commonly found in the epiphyseal end of long bones in the lower extremities, but rarely have also been reported in the carpal bones.<sup>4,5</sup> In the carpal bones the scaphoid and lunate are the most frequently involved bones.<sup>5</sup>

According to Schajowicz, et al. IOG can be categorized in two

types on the basis of its pathogenesis. The idiopathic or primarily type which may occur due to mucoid degeneration by intramedullary metaplasia or revitalization of bone aseptic necrosis.<sup>6</sup> The penetrating or less common type which may originate from penetration of a soft tissue ganglion into the adjacent bone.<sup>6</sup> William, et al. proposed a reverse theory, which was mainly based on the evidence of the modern imaging techniques. According to it a minority of IOG especially the eccentric ones, exist primarily in bone and spread to the soft tissues later.<sup>5</sup>

Most cases of IOGs are symptom free and found incidentally after wrist imaging performed for other reasons. In plain radiographs IOGs present as lucent lytic lesion in the carpal bones with surrounding thin sclerotic rim. This was true in all of our cases. IOGs can be correctly diagnosed by plain radiography and most of the time there is no need for any further diagnostic imaging modalities. This scenario is different when IOG is found in the carpal bones of patients with chronic wrist pain. In this situation a thorough history review, complete physical examination and complementary imaging modalities of MRI, CT scan and specially bone scan will help to make a comprehensive differential diagnosis list to approach the painful wrist.

Radiolucent carpal bone lesions usually are symptom-free incidental findings and their differential diagnosis includes IOGC, osteoarthritic cyst, post-traumatic cyst, simple bone cysts, and aneurysmal bone cyst. When they present themselves as painful wrist, Kienbock's disease, osteoid osteoma and osteoblastoma should be included in differential diagnosis list.<sup>7</sup>

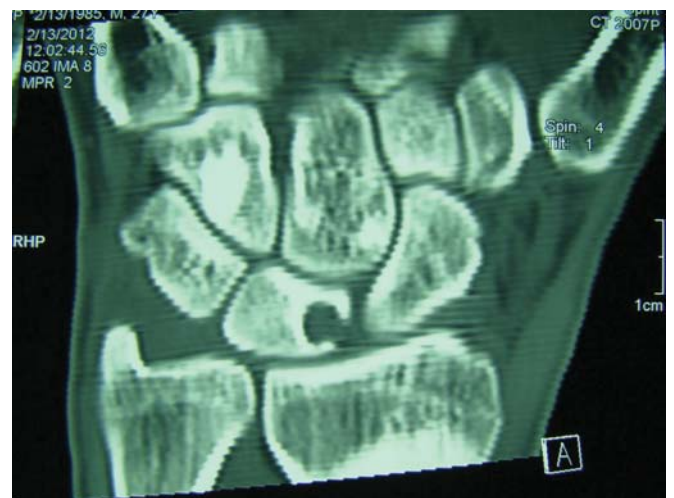
Van den dungen, et al. in their prospective survey studied 51 dorsal soft tissue ganglion cysts in 51 patients and found concomitant 29 asymptomatic IOG in carpal bones of 24 patients (47%).<sup>1</sup> Lunate was the most involved carpal bone (55%) followed by the capitate. They suggested common etiology for these two types of ganglions.<sup>1</sup>

Uriburu and Levy reported 15 IOGs in 13 patients.<sup>8</sup> In their series 9 IOGs were located in the lunate bone. In 11 cases there was an anatomic continuity of IOG with extra osseous ganglia. They treated the patients with curettage of the cyst and bone grafting which ended in very good results.<sup>8</sup>

Clinical findings of symptomatic IOG in carpal bones may include chronic dull wrist pain, tenderness on the dorsal aspect of the wrist on the lunate area and occasionally mild limitation in



**Figure 1.** Postero anterior and Lat radiographs showing pure lytic lesion in the lunate bone adjacent to the scapholunate joint with thin sclerotic rim.



**Figure 2.** CT scan of the wrist was able to localize the lesion precisely. In this case there is a penetration in scapholunate joint.



**Figure 3.** Bone scan of the right wrist is showing the increased uptake on the lunate bone area.



**Figure 4.** T2 weighted MRI showing hyperintense signal adjacent to the triquetrolunate joint.



**Figure 5.** T2 weighted MRI showing penetration of the cystic lesion to the scapholunate joint in this case.



**Figure 6.** Intra operative appearance of the lunate cyst after dorsal approach.

the wrist joint range of motion. Patients may have a history of previous wrist trauma. While many IOGCs are symptom-free, all of our six cases attending the hand clinic had chronic wrist pain without the history of recent trauma.

The choice of treatment depends on the IOG's radiological features, and especially on clinical findings. In asymptomatic IOG, treatment is recommended whether its size is growing in imaging findings.<sup>8</sup> Growing IOG can result in traumatic and collapsing fracture in lunate with serious complications.<sup>8</sup> When IOG has been completely stopped growing and there is no cortical defects or collapsing fractures, regular follow-up with radiographic examination is recommended.

In symptomatic IOGCs surgical treatment is indicated if other reasons of wrist pain ruled out properly. We believe that bone scan has a special role in decision-making process in this regard. Increased uptake in lunate area in a painful wrist indicates a symp-

tomatic IOG, which probably will respond to surgical treatment. In all of our cases there was an increased uptake in bone scan of lunate location. All cases became pain free after surgical treatment. The treatment of choice is curettage and bone graft.<sup>3,6,8</sup> We proceed this strategy in treatment of our cases. Recurrence of treated IOGC is very rare.<sup>8</sup> We did not have recurrence or collapse in treated lunates.

Lunate bone IOG should be included in differential diagnosis list of chronic wrist pain especially in the presence of increased uptake in bone scan located on the lunate area.

**Investigation Performed at:** *Department of Orthopedic Surgery, Shafa Yahyeian Rehabilitation Center, Iran University of Medical Sciences, Tehran, Iran.*

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**Level of the Evidence:** *IV retrospective study – case series*

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