CASE REPORT

Intraosseous Ganglion Cyst of the Capitate Treated by Intralesional Curettage, Autogenous Bone Marrow Graft and Autogenous Fibrin Clot Graft

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We report a very rare case of intraosseous ganglion cyst of the capitate in a 54-year-old female who complained of a painful right wrist mass for 1 year. Computed tomography study showed an expansile osteolytic lesion with sclerotic margin and thinning of the cortex. Combined soft tissue ganglion cyst was also noted at operation and confirmed by pathologic study. The case was treated by a new method of autogenous bone marrow and fibrin clot graft after intralesional curettage. After a 2-year follow-up, the capitate revealed complete bony union and the symptoms were relieved with good functional results. [*J Chin Med Assoc* 2007;70(5):222–226]

Key Words: bone marrow graft, capitate, fibrin clot graft, intraosseous ganglion cyst

Introduction

Intraosseous ganglion cyst is an infrequent cause of wrist pain. Isolated rare cases of intraosseous ganglion in the carpal bones have been reported, most commonly in the lunate and scaphoid.[1–4] In the capitate, it is very rare.[5] The condition presents as chronic wrist pain with radiologic cystic lesion within the captitate with sclerotic border. The radiolucent carpal lesions, however, may be symptom-free and the differential diagnosis includes juxta-articular cysts of osteoarthritis, post-traumatic cyst and simple bone cysts.[6] We describe a symptomatic case which was successfully treated by intralesional curettage, autogenous bone marrow graft and autogenous fibrin clot graft.

Case Report

A 54-year-old female complained of painful sensation of her right hand with a palpable mass, 2 × 1.5 × 1 cm in size (Figure 1), for about 1 year. The grasp strength was symmetrically normal, but the range of motion of the right wrist was less (flexion: 50°; extension: 60°) when compared with the left (flexion: 85°; extension: 90°). X-ray revealed a radiolucent lesion within the capitate with sclerotic border (Figure 2). An increased uptake on the right wrist was noted by Tc-99m methylene diphosphonate (TC-99m-MDP) whole-body bone scan study. Meanwhile, a gallium-67 inflammation scan revealed no abnormal uptake. An expansile osteolytic lesion with sclerotic margin and thinning of the cortex was found on computed tomography (CT) study. The density of the lesion was 35–45 Hounsfield Units on CT measurement. The operative findings revealed a soft tissue ganglion cyst, 1.5 × 1.5 × 0.7 cm in size, located just above the capitate and about 2 mL of gelatinous material within the capitate (Figure 3). Operation of marginal excision of soft tissue tumor, intralesional curettage of osseous tumor and bone marrow graft and autogenous fibrin clot graft were performed. A myxoid degeneration and focal chronic inflammation

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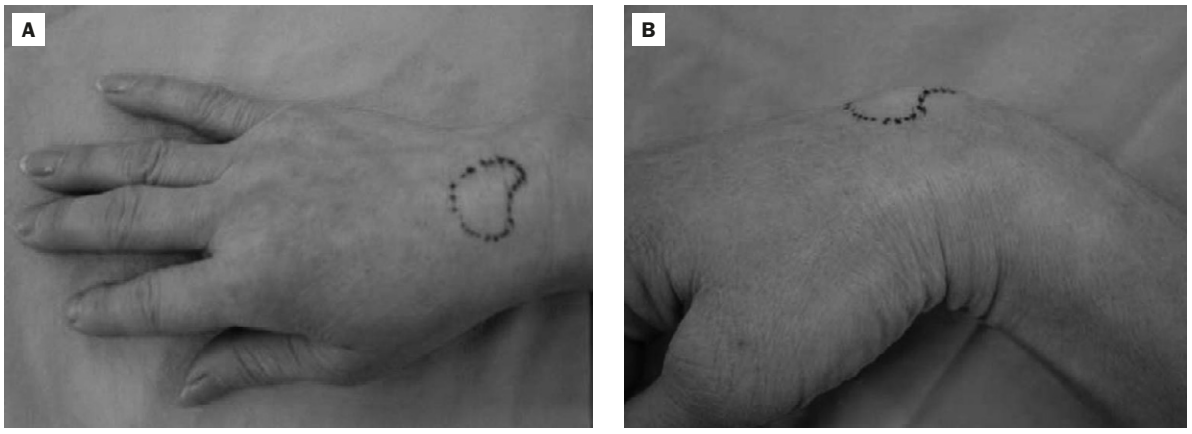

Figure 1. Gross appearance of a palpable tender mass over the right dorsal wrist (marked by a pen).

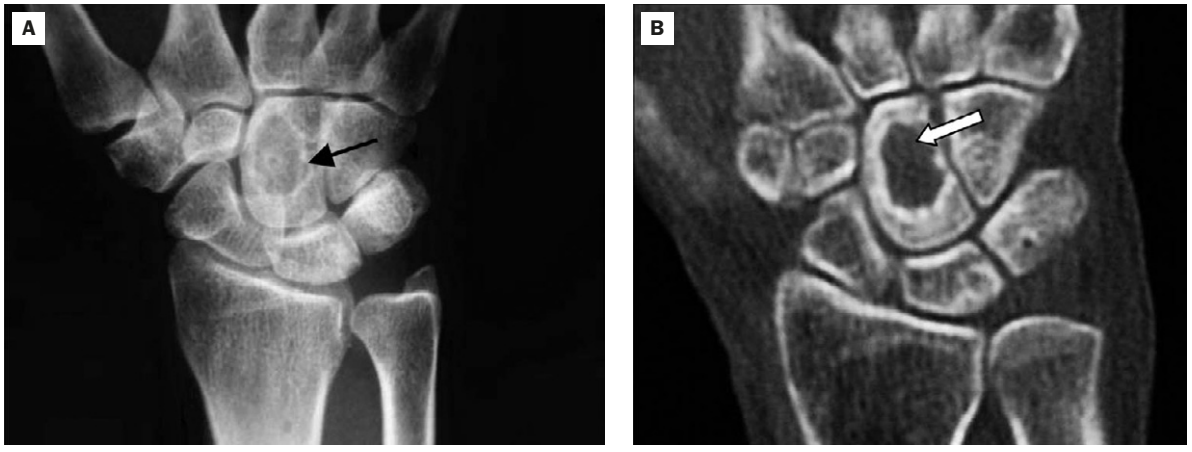

Figure 2. (A) A radiolucent lesion within the capitate with sclerotic border (black arrow); (B) computed tomography study reveals the osteolytic lesion inside (white arrow).

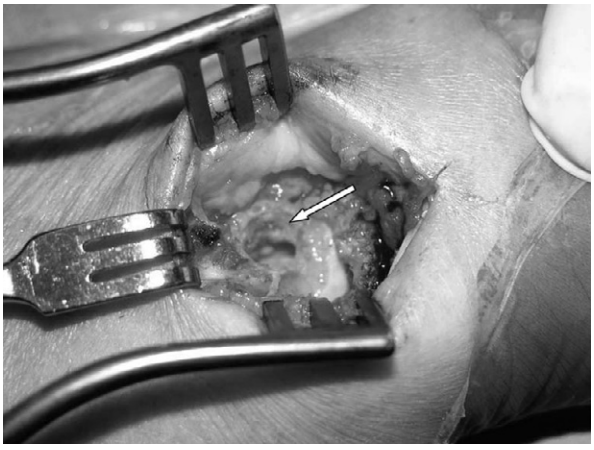

Figure 3. A soft tissue ganglion located just above the capitate and gelatinous material found within the capitate after creating a cortical window (white arrow).

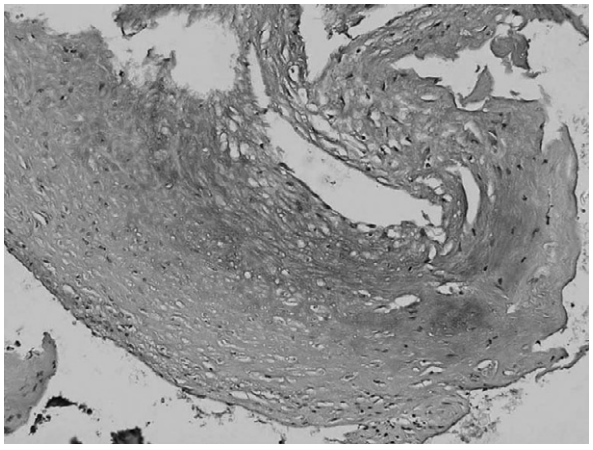

Figure 4. Fibrous tissue and bone with myxoid degeneration and focal chronic inflammation.

(Figure 4) was found in the pathologic study. Diagnosis of ganglion cysts of both the soft tissue and intraosseous lesion was impressed by the clinical, radiographic, and pathologic findings. The patient received short-arm cast immobilization for 6 weeks after operation. The range of motion had greatly improved (Figure 5) and the patient was totally free from earlier symptoms, with full grip strength, 3 months after operation.

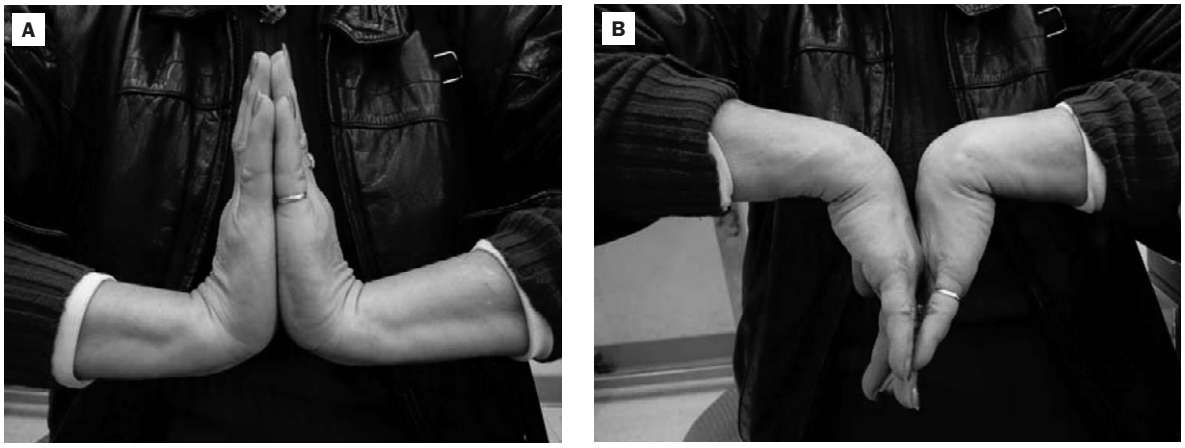

Figure 5. Improvement of range-of-motion of the right wrist after operation (flexion: 70°; extension: 90°).

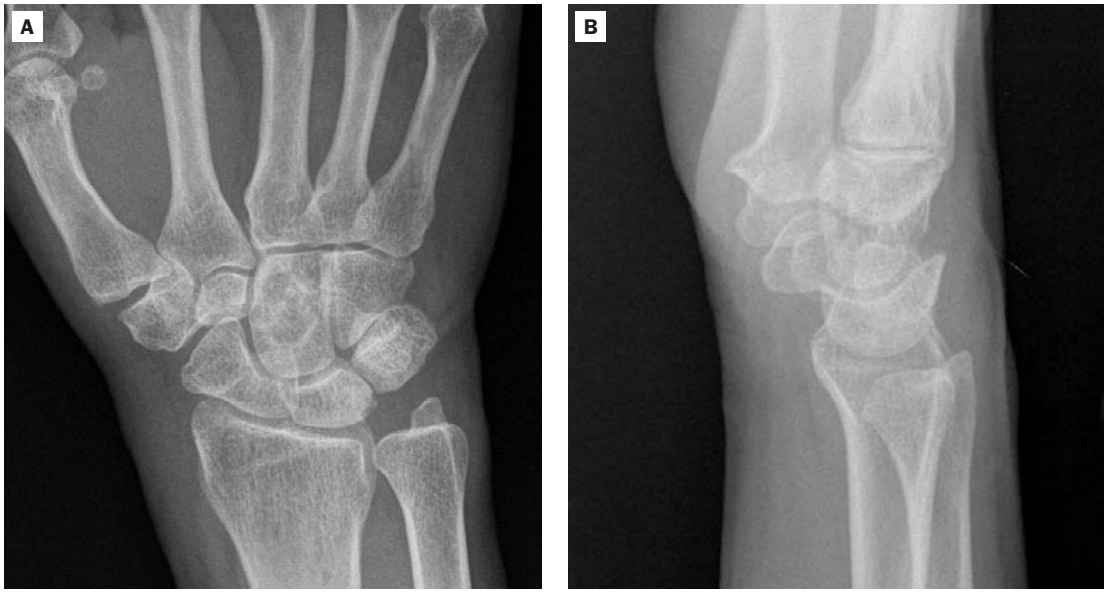

Figure 6. Radiograph shows bony union without recurrence 2 years after operation.

At 2-year follow-up, the bone was completely healed (Figure 6).

Discussion

The causes of both soft tissue and intraosseous ganglion remain unsettled. Most patients present with aching pain and no history of prior trauma.[7] Acute trauma may lead to the fortuitous radiographic discovery of the lesion but probably does not contribute to its cause.[6] In this case, the patient had been a cleaner for > 30 years. The possible causes in this patient may be due to repeated overuse of her dominant hand every day. Intraosseous ganglion may have developed either within the bone near but not directly communicating with a joint or from adjacent joint tissues with secondary penetration into bone.[8] The first type is more commonly reported.[1–3] In this presented case, the operative findings of the cyst originating from the soft tissue ganglion above eroding into capitate are consistent with the penetrating type, which has been reported previously.[3,5,9–11] Intraosseous ganglion has been reported most commonly in the epiphyses of long tubular bone.[12] Most frequently, they develop in the subchondral bone of the lower limb, primarily the hip, knee, and ankle, with the femoral head and the medial malleolus being the 2 most common locations. Schajowicz et al[2] reported 88 cases, 16 involving the carpal bones, including scaphoid, lunate, triquetrum, and capitate. Lesions in capitate are reported very rarely. The radiographs show a well-defined osteolytic area outlined by

Table 1. Comparison of the treatment of carpal intraosseous ganglion cyst

Authors	Lesion site (case no.)	Treatment	Bone healing	Functional outcome
Iwahara et al[3]	Lunate (1)	Curettage & cancellous bone graft	No mention	Pain-free
Uriburu & Levy[4]	Scaphoid (6) & Lunate (9)	Curettage & cancellous bone graft	Healed	Good: 14; partial lunate collapse: 1
Bowers & Hurst[5]	Scaphoid (1)	Curettage & corticocancellous bone graft		No mention
Mogan et al[6]	Lunate (2)	Curettage & cancellous bone graft	No mention	Symptom-free
Helal & Vernon-Roberts[9]	Pisiform (1)	Excision		Limitation of range of motion
Tham & Ireland[13]	Lunate (9)	Curettage & cancellous bone graft	No mention	Excellent: 6; good: 2; poor: 1
This case	Capitate (1)	Curettage, bone marrow & fibrin clot grafts	Healed	Excellent

a sclerotic rim. Tomographic and arthrographic studies are useful in demonstrating a communication between the intraosseous ganglion and the adjacent joint.[3]

The pathologic finding is identical to its soft tissue counterparts in all respects, with a smooth translucent wall composed of compressed collagen fibrins devoid of synovial lining.[13] Intraosseous ganglion cysts may be most easily confused pathologically with the juxta-articular cysts of osteoarthritis.[14] The earlier age of occurrence and the absence of other stigmas of osteoarthritis are helpful in differentiating these 2.

Curettage of the cyst and packing with cancellous bone graft were performed in most reported cases.[3] The technique of bone grafting involves operative harvest from a donor site having many complications, including painful scar, infection, hematoma, fracture, and gait disturbances.[15] In our management, a new method including intralesional curettage, autogenous bone marrow graft, autogenous fibrin clot graft was employed. Bone marrow contains osteoprogenitor cells and plays an important role in the process of bone regeneration.[16] The fibrin clot contains a large amount of the aggregated platelets which contains several growth factors, including platelet-derived growth factor (PDGF) and transforming growth factor beta (TGF-β).[17] Local application of PDGF and TGF-β may enhance fracture healing in animal studies.[18] Previous study shows that TGF-β and PDGF are able to stimulate cell growth in callus tissue and are powerful for fracture healing.[19] A combination of both growth factors may enhance the cascade of bone healing. The comparison of traditional treatment with our new method in similar carpal lesions (Table 1) shows that the results of bone healing and functional outcome show no significant difference, but there is no risk of complication of donor site by our management. There was no structural bone graft used, so the wrist was immobilized for a period of 6 weeks. The capitate lesion was completely healed. Removal of the involved bone is unnecessary.[20] The results reported are excellent, with rare recurrences.

Acknowledgments

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References

1. Bauer TW, Dorfman HD. Intraosseous ganglion: a clinicopathologic study of 11 cases. *Am J Surg Pathol* 1982;6:207–13.
2. Schajowicz F, Sainz MC, Slullitel JA. Juxta-articular bone cysts (intraosseous ganglia). *J Bone Joint Surg* 1979;61b:107–16.
3. Iwahara T, Hirayama T, Takemitu Y. Intraosseous ganglion of the lunate. *The Hand* 1983;15:297–9.
4. Uriburu IJ, Levy VD. Intraosseous ganglia of the scaphoid and lunate bones: report of 15 cases in 13 patients. *J Hand Surg* 1999;24:667–70.
5. Bowers WH, Hurst LC. An intraarticular-intraosseous carpal ganglion. *J Hand Surg* 1979;4:375–7.
6. Mogan JV, Newberg AH, Davis PH. Intraosseous ganglion of the lunate. *J Hand Surg* 1981;6:61–3.
7. Seymour N. Intraoseous ganglia. Report of two cases. *J Bone Joint Surg (Br)* 1968;50:134–7.
8. Fealy MJ, Lineaweaver W. Intraosseous ganglion cyst of the scaphoid. *Ann Plast Surg* 1995;34:215–7.
9. Helal B, Vernon-Roberts B. Intraosseous ganglion of the pisiform. *The Hand* 1976;8:150–4.
10. Brown I, Huffstadt AJC. Intraosseous ganglia. *The Hand* 1981; 13:51–4.
11. Dungen SV, Marchesi S, Ezzedine R, Bindou D, Lorea P. Relationship between dorsal ganglion cysts of the wrist and intraosseous ganglion cyst of the carpal bones. *Acta Orthop Belg* 2005; 71:535–9.
12. Feldman F, Johnston A. Intraosseous ganglion. *Am J Roentgenol Radium Ther Nucl Med* 1973;118:328–43.

13. Tham S, Ireland DCR. Intraosseous ganglion cyst of the lunate: diagnosis and management. *J Hand Surg* 1992;17B:429–32.
14. Sim FH, Dahlin DC. Ganglion cysts of bone. *Mayo Clin Proc* 1971;46:484–8.
15. Gershuni DH, Pinsker R. Bone grafting for non-union of fractures of the tibia: a critical review. *J Trauma* 1982;22:43–9.
16. Garg NK, Gaur S, Sharma S. Percutaneous autogenous bone marrow grafting in 20 cases of ununited fracture. *Acta Orthop Scand* 1993;64:671–2.
17. Kawase T, Okuda K, Wolff LF, Yoshie H. Platelet-rich plasma-derived fibrin clot formation stimulates collagen synthesis in periodontal ligament and ostoblastic cells *in vitro*. *J Periodontol* 2003;74:858–64.
18. Lind M, Schumacher B, Soballe K, Keller J, Melsen F, Bunger C. Transforming growth factor-beta enhances fracture healing in rabbit tibiae. *Acta Orthop Scand* 1993;64: 553–6.
19. Andrew JG, Hoyland JA, Freemont AJ, Marsh DR. Platelet-derived growth factor expression in normally healing human fracture. *Bone* 1995;16:455–60.
20. Crane AR, Scarano JJ. Synovial cysts (ganglia) of bone. *J Bone Joint Surg (Am)* 1967;49:355–61.