Case Report

J Chin Med Assoc
2004;67:537-541

Periacetabular Giant Cell Tumor Treated with Intralesional Excision and Allograft Reconstruction

Ming-Te Cheng[1,2]
Tain-Hsiung Chen[1,2]
Wei-Ming Chen[1,2]
Ching-Kuei Huang[1,2]
Chao-Ching Chiang[1,2]
Yu-Ping Su[1,2]

[1] *Department of Orthopaedics and Traumatology, Taipei Veterans General Hospital;*
[2] *Department of Surgery, School of Medicine, National Yang-Ming University, Taipei, Taiwan, R.O.C.*

Giant cell tumors of the acetabulum are uncommon lesions. Their diagnosis is often delayed due to their slow progression, late onset symptoms and easily been obscured by bowel gas in plain pelvic radiographs. The tumor size is always very large at the time of diagnosis, with major nerve and joint involvement. Management of such tumor remains challenging to orthopedic surgeons. Between 1992 and 1999, 3 acetabular giant cell tumors were diagnosed and managed at our institution. The treatment modality was intralesional tumor excision with structural allograft reconstruction. The margin of tumor was routinely managed with high-speed burring and phenol application. All 3 patients were free of local recurrence at a mean follow-up of 89 months. Postoperative palsy of sciatic nerve occurred in 1 patient, but no complications such as wound infection or fracture were seen. The nerve palsy recovered completely 1 year later. The final functional outcome of the 3 patients was excellent. The result appears that intralesional excision with adjuvant therapy is feasible in the management of giant cell tumor of the acetabulum and is able to obtain a satisfactory outcome.

Key Words
acetabulum;
giant cell tumor;
intralesional;
pelvis;
structural allograft

Giant cell tumor is a locally aggressive tumor with high rate of recurrence if not appropriately managed. It comprises 5% to 7% of all bone neoplasms in a number of series in the Western world.[1,2] Pelvic involvement of giant cell tumor is unusual; it accounts for only 1.5~6% of all giant cell tumors of bones.[1-3]

To the best of our knowledge, there are only 3 English literature reports,[4-6] comprising 5, 7, and 19 patients respectively, that dealt exclusively with giant cell tumor of the pelvic bone. Adequate local control through complete tumor removal is an important therapeutic goal. However, aggressive resection of tumors in the pelvis, particularly involving the acetabulum, must be coupled with preservation of hip joint and avoidance of neurovascular injuries. Therefore, periacetabular giant cell tumor remains a challenging problem in management. We now present the diagnosis, management, and outcome of 3 periacetabular giant cell tumors.

CASE REPORTS

Between 1992 and 1999, 73 cases with giant cell tumor of bones were diagnosed and treated at our institution. There were 36 males and 37 female with an average age of 34 years (range, 18 to 65 years). Five of the tumors were located in the pelvis, accounting for 6.9% of all cases. There were 4 males and 1 female, with an average age of 33 years (range, 27 to 38 years). Three of the 5 pelvic tumors involved the acetabulum (Table 1). All images, histological sections, and functional results of the 3 cases were reviewed.

Case 1

A 34-year-old man presented with increasing pain over his right gluteal area for 6 months. Radiographs showed a large, expansile osteolytic lesion in his right inferior pubic ramus and right ischium with involvement

Received: December 12, 2003.
Accepted: April 30, 2004.

Correspondence to: Wei-Ming Chen, MD, Chief, Division of Orthopaedic Traumatology, 201, Sec. 2, Shi-Pai Road, Taipei Veterans General Hospital, Taipei 112, Taiwan.
Tel: +886-2-2875-7557 ext. 101; Fax: +886-2-2875-7559; E-mail: wmchen@vghtpe.gov.tw

Table 1. Details of the 3 patients with periacetabular giant cell tumor

Case	Gender	Age at the time of diagnosis (years)	Interval between onset of symptoms to diagnosis (months)	Location of tumor	Size of tumor (cm^3)	Surgical procedures	Union of allograft (months)	Follow-up (months)	MSTS functional score (%)	Complications
1	M	34	6	Ilium, ischium, and inferior pubic ramus.	12*5*3	Intralesional excision + allograft	8	115	90	Sciatic nerve palsy, recovered 1 year later
2	F	27	2	Ilium and pubis.	5*3*2	Intralesional excision + allograft	6	80	97	-
3	M	38	4	Ischium, ilium, and inferior pubic ramus.	5*3*2	Intralesional excision + allograft	6	74	93	-

MSTS = Musculoskeletal Tumor Society[8].

of the inferior part of the right acetabulum. Biopsy revealed evenly dispersed multinucleated giant cells in a vascular stroma rich with rounded or spindle-shaped cells, which were typical histological features of a giant cell tumor. Intralesional excision with curettage of the tumor from a posterior approach was performed, followed by power burring and chemical cauterization with phenol. Structural allograft was used to reconstruct the bony defect of the medial and inferior acetabulum after the tumor resection.

Case 2

A 27-year-old female visited us for help due to progressive pain over her left groin area for 2 months. Radiographs revealed an osteolytic expansile lesion over the left pubis and ilium with acetabulum extension (Fig. 1A). Incisional biopsy revealed a combination of oval mononuclear cells and multinucleated giant cells, scattered uniformly throughout the lesion. She received intralesional tumor excision from a combined anterior and ilio-inguinal approach. Power burrs and phenol were used to extend the surgical margin. Structural allograft was used to restore the structural integrity of the medial acetabular wall after the tumor resection (Fig. 1B).

Fig. 1. Radiograph **(A)** of a 27-year-old female with a giant cell tumor of the left pubis and ilium with medial acetabular wall involvement (arrowhead). Radiograph taken 1 year after surgery showing good healing of the lesion (**B**).

Case 3

A 38-year-old male presented with a 4-month history

of increasing pain over his right hip. Radiographs revealed an osteolytic lesion over the right inferior pubic ramus, ischium, and acetabulum with inner pelvic wall destruction (Figs. 2A, 2B). He received intralesional excision of the tumor through a combined ilio-inguinal and anterior approach. Intralesional excision with curettage of tumor was performed. Power burrs and phenol were also routinely used. Structural allograft was used to reconstruct the bony defect of the medial acetabular wall (Fig. 2C).

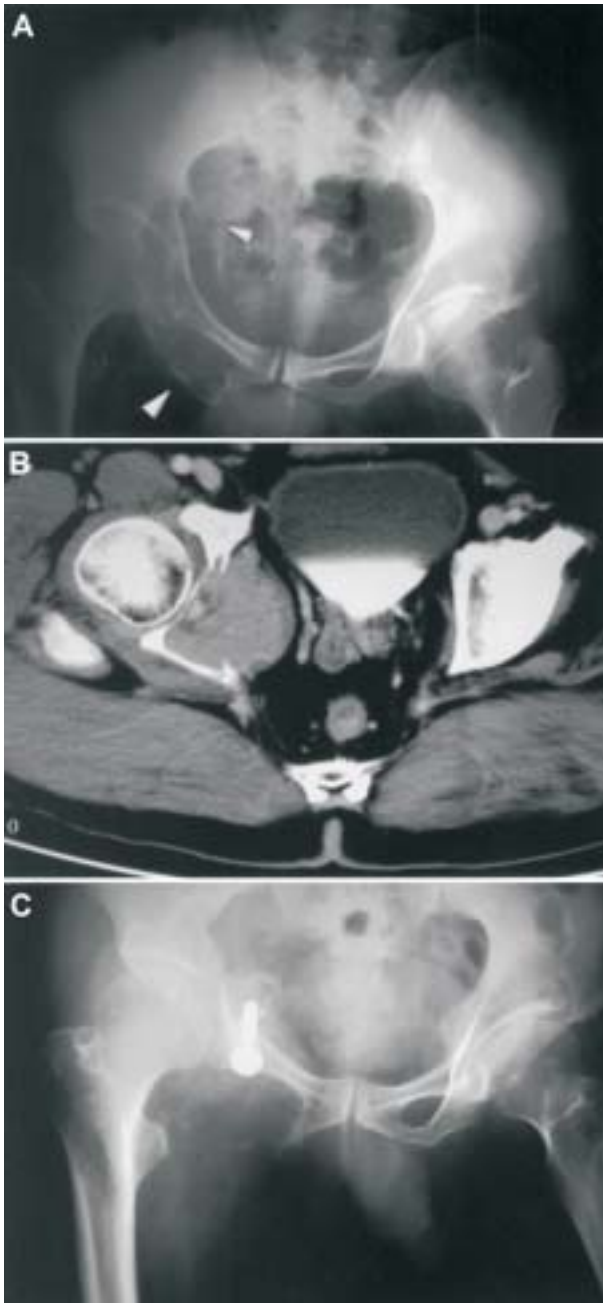

Fig. 2. Radiograph and CT scan **(A**,**B)** of a 38-year-old male with a giant cell tumor of the right inferior pubic ramus, ischium, and acetabulum with inner pelvic wall destruction (arrowheads). Radiograph taken 1 year after surgery showing good healing of the grafting site with preservation of hip joint **(C)**.

According to the classification system of the Musculoskeletal Tumor Society (MSTS),[7] all 3 patients were classified as Stage III aggressive lesions. All patients had resection of the major part of the tumor with intralesional margin. The margin was extended by power burring and phenol application. There was no evidence of local recurrence in the 3 patients at a mean follow-up of 89 months (range, 74-115 months). All allograft-host bone junctions healed uneventfully within 8 months.

Sciatic nerve palsy occurred in 1 patient who had tumor involving the right acetabulum, ischium, and pubic bone. He was treated by physiotherapy and was able to walk without an assistant device 1 year later. The nerve function was completely recovered (Table 1, case 1). Fortunately, there were no other complications such as wound infection, fracture, bowel or bladder dysfunction in the remaining 2 cases.

According to the functional evaluation system of the MSTS proposed by Enneking,[8] the average functional outcome was 93.3% in this series (range, 90% to 97%). All 3 patients ambulated independently and free of pain. No sarcomatous change or pulmonary metastasis of tumor was noted in the follow-up period. In addition, there were no obvious degenerative changes of the hip joint and no avascular necrosis of the femoral head.

DISCUSSION

Giant cell tumors of the acetabulum are uncommon lesions. Only a few cases were reported in some series (Table 2). In our series, only 3 cases, accounting for 4% of all giant cell tumors of bones diagnosed at our institution in the same period, involved the acetabular area. The average age of the 3 patients was 33 years (range, 27 to 38 years), similar to that of the patients who had giant cell tumors in extremities.

The diagnosis of acetabulum giant cell tumor is often delayed due to its slow progression, late-onset symp-

Table 2. Periacetabular giant cell tumor reported in literatures

Author	Published year	Number of cases	Surgical margin	Reconstructive methods	Adjuvant procedures	Local recurrence	Complications
Osaka S & Toriyama S[4]	1987	2	Wide	One pelvic prosthesis One ilio-femoral fusion	-	-	Prosthesis removed due to infection
Kattapuram AS, *et al.*[5]	1996	3	Intralesional	Curettage + osteoarticular acetabular allograft in two cases and cancellous allograft in one case	Radiotherapy in one patient	-	-
Oda Y *et al.*[13]	1998	1	Wide	Arthrodesis	-	-	-
Natarajan MV, *et al.*[14]	2001	1	Wide	Saddle prosthesis	-	-	-
Cottias P, *et al.*[15]	2001	2	Wide	Saddle prosthesis	-	-	One saddle migration

toms, and easily been missed and obscured by bowel gas in plain pelvic radiographs. Therefore, the tumor size is always very large when diagnosed. The sizes of the tumors ranged from $5 \times 3 \times 2$ cm^3 to $12 \times 5 \times 3$ cm^3 in these 3 cases, which made complete excision of tumor more difficult.

The treatment of bony giant cell tumor emphasizes local tumor control and improved functional outcome. Although extralesional tumor excision leads to more than 90% local tumor control, the functional results are often very poor.[2,9] In contrast, intralesional tumor excision with simple curettage leads to excellent functional outcome, but 90% local recurrence rate was noted after it was first introduced by Bloodgood.[10] Therefore, many local adjuvant therapies such as phenol application, high-speed burring, cement, and cryotherapy have been introduced to extend the surgical margin of intralesional tumor excision to decrease local recurrence of tumor. Despite these adjuvant therapies being utilized, the incidence of local recurrence was about 17 to 20% in recent studies.[10-12] When the tumor involves the acetabulum, its management will be more challenging due to the delayed diagnosis, huge tumor size, deep anatomic site, and major nerve and joint involvement. Individual approaches for acetabular giant cell tumor should be selected according to the size, location, staging of the tumor and the expectation of the patient.

Extralesional excision may obtain excellent local tumor control, but it is usually not feasible in acetabular tumor, and the functional results are often poor.[2,9] Complications such as saddle migration, elevation of ilium, nonunion of arthrodsis, and deep infection were reported.[5,11,13-15] However, in O'Donnel's series, 3 patients who underwent intralesional excision with massive acetabular osteoarticular allograft reconstruction obtained good functional results and local tumor control at a mean follow-up of 5 years.[5] In our series, because the size of the tumor was not very huge, intralesional excision with allograft reconstruction was used. No local recurrence was noted radiographically or clinically in any patient. In addition, the functional outcome was satisfactory. Therefore, with careful selection of patients, intralesional tumor excision and allograft reconstruction have been shown to successfully achieve local control of the periacetabular giant cell tumor, obtain predictable healing of the bone defect, and give good functional results.

REFERENCES

1. Dahlin DC, Unni K. K. Giant cell tumor (osteoclastoma), *Dahlin's Bone Tumors: General Aspecsts and Data on 8,542 Cases*, 4th ed. Springfield, IL: Charles C. Thomas, 1986:119-40.
2. Campanacci M, Baldini N, Boriani S. Giant cell tumor of bone. *J Bone Joint Surg* 1987;69:106-14.
3. Sung HW, Kuo DP, Shu WP, Chai YB, Liu CC, Li SM. Giant cell tumor of bone: analysis of 2 hundred and 8 cases in Chinese patients. *J Bone Joint Surg* 1982;64:755-61.
4. Osaka S, Toriyama S. Surgical treatment of giant cell tumor of pelvis. *Clin Orthop* 1987;222:123-31.
5. Kattapuram AS, O'Donnell RJ, Huszar M, Rosenberg AE, Kattupuran SV, Mankin HJ. Surgical management of

innominate giant cell tumor. *Clin Orthop* 1996;329:281-7.
6. Sanjay BK, Frassica FJ, Frassica DA, Unni KK, McLeod RA, Sim FH. Treatment of giant-cell tumor of pelvis. *J Bone Joint Surg* 1993;75:1466-75.
7. Enneking WF, Spanier SS, and Goodman MA. A system for the surgical staging of musculoskeletal sarcoma. *Clin Orthop* 1980;153:106-20.
8. Enneking WF, Dunham W, Gebhardt MC, Malawar M, Pritchard DJ. A system for the functional evaluation of reconstructive procedures after surgical treatment of tumors of the musculoskeletal system. *Clin Orthop* 1993;286:241-6.
9. Gitelis S, Mallin BA, Piasecki P, Turner F. Intralesional excision compared with en bloc resection of giant cell tumors of bone. *J Bone Joint Surg* 1993;17:1648-55.
10. Bloodgood JC. The conservative treatment of giant cell sarcoma, with the study of bone transplantation. *Ann Surg* 1912; 56:210-39.
11. Blackley HH, Wunder JS, Davis AM, White LM, Kandel R, Bell RS. Treatment of giant cell tumors of long bone with curettage and bone-grafting. *J Bone Joint Surg* 1999;81:811-20.
12. Malawer MM, Bickels J, Meller I, Buch RG, Henshaw RM, Kollender Y. Cryosurgery in the treatment of giant cell tumor: A long-term follow-up study. *Clin Orthop* 1999;359:176-88.
13. Oda Y, Miura H, Tsuneyoshi M, Iwamoto Y. Giant cell tumor of bone: oncological and functional results of long-term follow-up. *Jpn J Clin Oncol* 1998; 28:323-8.
14. Natarajan MV, Bose JC, Mazhavan V, Rajagopal TS, Selvam K. The Saddle prosthesis in periacetabular tumours. *Int Orthop* 2001;25:107-9.
15. Cottias P, Jeanrot C, Vinh TS, Tomeno B, Anract P. Complications and functional evaluation of 17 saddle prostheses for resection of periacetabular tumors. *J Surg Oncol* 2001;78: 90-100.