



A new technique for aneurysmal bone cysts of the proximal humerus: cortical collapsing

Humerus üst uç yerleşimli anevrizmal kemik kistlerinin tedavisinde yeni bir yöntem: Kortikal çöktürme

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Amaç: Bu çalışmada, humerus proksimal metafizine santral olarak yerleşmiş, geniş destrüksiyon yapmış anevrizmal kemik kistleri için geliştirdiğimiz yeni bir tekniğin sonuçları değerlendirildi.

Çalışma planı: Humerus proksimal metafizinde santral olarak gelişen ve geniş destrüksiyona neden olan, klinik ve radyografik olarak anevrizmal kemik kisti tanısı konan yedi hasta (5 erkek, 2 kız; ort. yaş 12.8; dağılım 9-15) kortikal çöktürme ve fibuladan alınan masif otogreft ile tedavi edildi. Tüm olgularda Capanna ve ark.nın sınıflandırmasına göre tip II, Campanacci ve ark.nın sınıflandırmasına göre aktif tümör vardı. Bir olgu takipten çıktığı için çalışma dışı bırakıldı. Hastaların ortalama takip süresi 49 ay (dağılım 12-105 ay) idi.

Sonuçlar: Ameliyat sonrası erken dönemde hiçbir olguda komplikasyon görülmedi. Radyografik değerlendirmede iki olguda kısmi nüks saptandı; bu olgulardan birine, ağrı yakınması nedeniyle ameliyat sonrası ikinci yılda küretaj ve greftleme uygulandı. Olgularda deformite izlenmedi. Sadece bir olguda 0.5 cm'lik kısalık saptandı. Ameliyattan yaklaşık bir yıl sonra metafizer bölgenin anatomik görünümde yeniden şekillendiği gözlemlendi. Tüm olgularda omuz eklem fonksiyonu normale yakın bulundu.

Çıkarımlar: Uyguladığımız teknikte, kortikal çöktürme ile greft ihtiyacı azalmakta, fibular greft de yapısal destek oluşturarak deformite oluşumunu engellemektedir.

Anahtar sözcükler: Kemik kisti, anevrizmal/cerrahi; kemik transplantasyonu; küretaj; humerus/patoloji/cerrahi.

Objectives: We evaluated the results of a new technique developed for aneurysmal bone cysts centrally located in the proximal humeral metaphysis leading to widespread destruction.

Methods: The study included seven patients (5 boys, 2 girls; mean age 12.8 years; range 9 to 15 years) who were treated with cortical collapsing and massive fibular autograft for centrally located aneurysmal bone cysts in the proximal humeral metaphysis leading to widespread destruction. All the patients had type II and active tumors according to the criteria of Capanna et al. and Campanacci et al., respectively. Final evaluations included six patients because one patient was lost to follow-up. The mean follow-up period was 49 months (range 12 to 105 months).

Results: No complications were seen in the early postoperative period. Radiographic examination showed partial recurrence in two patients; of whom, one patient underwent curettage and bone grafting in the postoperative second year because of pain and discomfort. No deformity was observed. One patient developed shortening of 0.5 cm. Radiographically, all the patients exhibited metaphyseal remodelling one year after surgery. Function of the shoulder joint was near-normal in all the patients.

Conclusion: In this technique, cortical collapsing reduces the amount of bone graft used, and massive fibular strut grafting provides structural support to prevent deformities.

Key words: Bone cysts, aneurysmal/surgery; bone transplantation; curettage; humerus/pathology/surgery.

Aneurysmal Bone Cyst (ABC) is a rare benign lesion, characterized with blood filled septas within the bone. Although ABC can be seen in whole skeleton,

usually long bones (65%) are affected. 80% of the patients are before the age of 20 and rarely detected after the age of 30. Growth plates are not usually affected in

metaphyseal region. However, in 23% of the patients, deformity might occurred due to growth plate destruction in aggressive types. Incidence of the secondary ABC is between 19-39 % (frequently giant cell tumor, and primary lesion identified in only 1/3 of cases). The treatment options of ABC might change according to patient's age, location and type of the lesion.

In this study, we evaluated the results of cortical collapsing and massive fibular autografting developed for aneurysmal bone cyst centrally located in the proximal humeral metaphysis leading to widespread destruction.

Patients and method

7 patients (5 male, 2 female; ages 9-15, mean age 12.8) who were treated with cortical collapsing and massive fibular autograft for centrally located ABC in the proximal humeral metaphysis leading to widespread destruction, included the study between January 2003-December 2006.

All cases were classified according to localization and activity. All the patients had type II and active tumors according to criteria of Capanna and Campanacci, respectively

In the follow-up period recovery of the patients were evaluated according to classification modified by Campanacci et al. from Neer. (i) Full recovery, all spaces caused by cyst filled with new bone formation. (ii) Partial recovery, new bone formation filled the gaps, but in some zones, osteolytic areas present. (iii) Recurrence, osteolytic lesions appeared after new bone formation and cortical thinning (iv) No response to treatment

In all cases, clinically and radiologically diagnosed ABCs, were confirmed by histopathologically.

Surgical technique

All cases were positioned at beach chair position and under general anesthesia, Deltopectoral exposure was used to reach lesion. Rhomboid shaped window created at the anterior wall of the tumor for curettage and fibular graft insertion with an osteotom. Curettage of the tumoral lesion was performed carefully to the cortex. Despite curettage, septas were excised and inner surface of the cavity was fully flattened. With tiny handsaw and osteotom the cavity was ostotomysed from inner surface as meridians.

Preventing from metaphyseal fracture is crucial. The length of the fibular graft decided and graft was obtained from the contralateral extremity under pneumatic tourniquet.

Fibular graft was placed in to the metaphysis sliding from anterior cortex. Proximal fixation of fibular graft was placed under the middle of the physeal region securely, on the other hand distal fixation to diaphysis performed with K-wires. Length of extremity was protected with longitudinal metaphyseal fractures. Longitudinal fractured cortex was collapsed around the fibular graft. (Figure 1). After cortical collapsing remaining small gaps was filled with fresh frozen spongius allograft. Drain was left around the lesion and incision was closed anatomically. A sling was used full time for 6 weeks. Isometric exercises was started immediately. 3 weeks, later ROM exercises allowed. 6 weeks later, if radiologically cortical union occurred, sling was taken out and protective full extremity function allowed.

The follow-up period was programmed every 3 months for the first year, every 6 months for the second year and once a year. Radiological and clinical follow-up (complications and functional results) performed. One case was excluded from the study because inadequate follow-up. The mean follow-up was 49 months. (between 12-105 months).

Results

No complications were seen in the early post-operative period. Radiographic examination revealed partial recurrences in two patients. One patient under-



Figure 1. Cortical collapsing after fibular graft placement

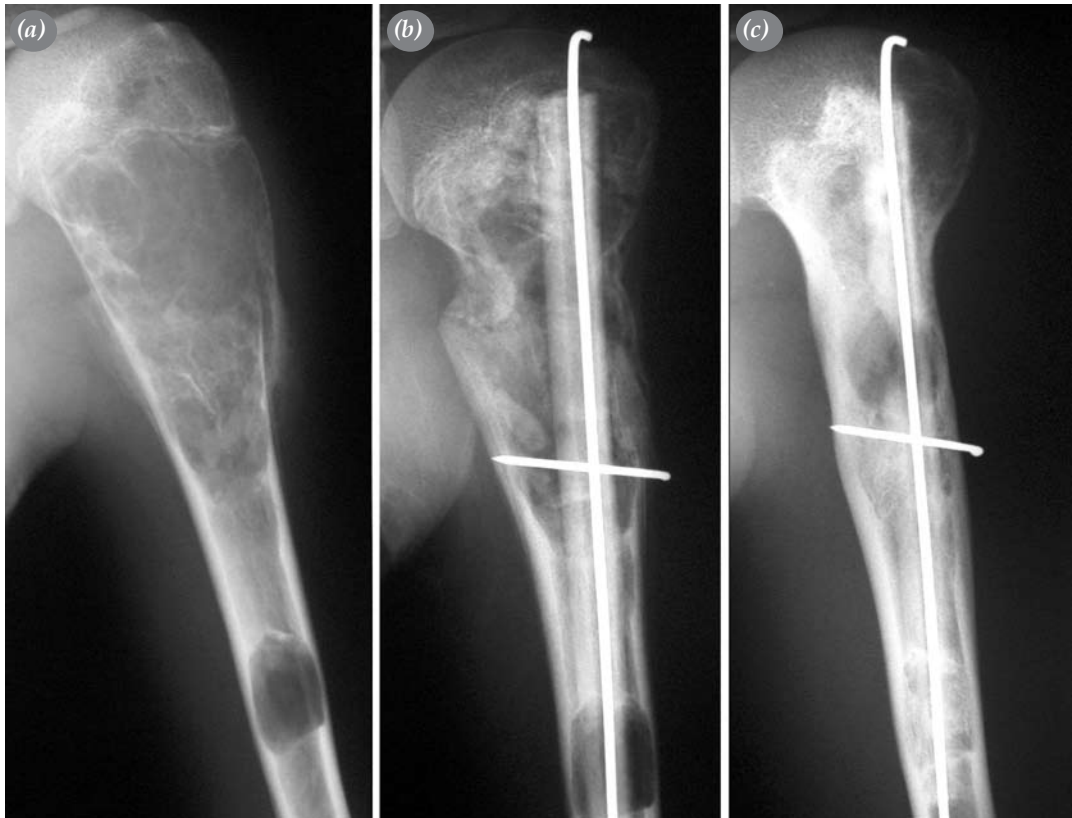


Figure 2. (a) Pre-operative and, (b) early post-operative (c) long term post-operative X-Rays of the patient.

went curettage and bone grafting in the postoperative second year because of pain and discomfort. In one patient 0.5 cm shortening occurred. Radiographically, all the patients exhibited metaphyseal remodelling at post-operative one year (Figure 1,2). Function of the shoulder joint was near-normal in all patients.

Discussion

ABC is a benign cystic lesion usually occurred between 10-20 years. Various treatment options were described such as, expanded cyst wall excision, curettage and grafting, cryotherapy, phenol injections, arterial embolisation, radiotherapy, bone cement applications, demineralised bone matrix, fibrosing agents (Ethiblok), segmental resections. According to these procedures, recurrence rates were reported between 10 %-59 %.^[3,4,8-16]

The most common procedure is curettage with/out grafting. However high recurrence rates were reported between 10 % to 59 %.^[2,4-16]

Ozaki et al(9) reported 17% recurrence rates with curettage and cement application. In the same study,

the results were compared with cryotherapy and lower complication rates were determined in the cement group. The advantages of this technique are easy to perform and structural support of the cement in the cavity. However it has limitations, in this technique neurovascular structures and growth plate should protect from the heat effect.^[8]

Although good results were reported with Ethiblok injection, 30% local and systemic complications such as infection, fistule formation, pulmonary thromboembolism were reported.^[5,17-19] Good results were reported between 82-96 % with Cryotherapy. However progression of fractures, local infection, fusion or nerve damage with associated fractures and growth plate destruction are potential complications.^[4,12,20]

Corticosteroid injections are ineffective in the treatment of aneurysmal bone cyst.^[21]

Although radiotherapy was used in the treatment of ABC in doses between 30-40 Gy to ossify cysts, it is not usually preferred various complications such as osteonecrosis, shortening, gonad damage and sarcoma progression might develop.



Figure 3.(a) Pre-operative and (b) long term post-operative X-Rays of the patient.

Segmental resections might perform in type II lesions according to Capanna's classification and specific anatomic localizations in fibula, costa, distal ulna, pubic arms, metatarsals and metacarpals. Although the recurrence rates are low shortening occurs .

In this study, we performed cortical collapsing and massive fibular autografting developed for aneurysmal bone cyst centrally located in the proximal humeral metaphysis leading to widespread destruction. These cases had important technical problems both for en-block resection because lesions were too close to the physis and curettage and grafting with widespread destructions .

Cortical collapsing reduce curettaged cavity and graft requirement decreased. Central fibular graft is important structural support and prevents shortening. This technique was performed to limited numbers of patients with specific lesions. The advantages of this technique are reduced bone graft , remodelling potential with patient satisfaction and acceptable functional outcome.

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