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Araştırma

Triple Methylprednisolone Injections for Simple Humerus Cysts at One-month Intervals

Murat Çakar[1], Ahmet Murat Bülbül[2]

[1]Sağlık Bilimleri Üniversitesi, Okmeydanı Eğitim ve Araştırma Hastanesi, Ortopedi ve Travmatoloji Kliniği, İstanbul
[2]İstanbul Medipol Üniversitesi, Tıp Fakültesi, Ortopedi ve Travmatoloji Anabilim Dalı, İstanbul

ABSTRACT

Objective: *The aim of this study was to retrospectively assess treatment of humerus simple cysts in the childhood period with 3 methylprednisolone injections at monthly intervals.*

Material and Method: *A total of 38 patients with simple humerus bone cyst were included in the study. Twenty patients were girls and 18 were boys. The mean age was 7.8 (4-14) years. Under anesthesia patients had methylprednisolone administered three times at the thinnest point of the cortex under fluoroscopy control. Early movement was begun and they were discharged on the same day. Healing was assessed according to the Neer classification.*

Results: *Patients were monitored for mean 32 months (12-60). Thirty-one (81.5%) patients recovered. 21 were classified as Neer type 1, 10 were Neer type 2, and 6 were Neer type 3. A fracture developed in a patient classified as Neer type 4. Three patients developed color changes on the skin after the 3rd injection. Two patients (5%) were identified to have unequal upper extremity lengths.*

Conclusions: *The low cost and complication rate and short hospital stay have added to the popularity of humerus simple cyst treatment with methylprednisolone injection. With different administration forms, 3 methylprednisolone treatments at one month intervals is a very effective method.*

Keywords: *bone cyst, humerus, simple bone cyst, steroid injection*

ÖZ

Basit Humerus Kistleri için Bir Aylık Aralıklarla Üçlü Metilprednizolon Enjeksiyonu

Amaç: *Bu çalışmanın amacı, çocukluk döneminde basit humerus kistlerinin aylık aralıklarla 3 metilprednizolon enjeksiyonu ile tedavisini geriye dönük olarak değerlendirmekti.*

Gereç ve Yöntem: *Basit humerus kemik kisti olan toplam 38 hasta çalışmaya dahil edildi. Yirmi hasta kız, 18'i erkekti. Ortalama yaş 7,8 (4-14)'di. Anestezi altında tüm hastalara floroskopi kontrolü altında korteksin en ince noktasında üç kez metilprednizolon enjeksiyonu yapıldı. İlgili ekstremiteye erken hareket başlandı ve hastalar aynı gün taburcu edildi. İyileşme, Neer sınıflamasına göre değerlendirildi.*

Bulgular: *Hastalar ortalama 32 ay (12-60) izlendi. Otuz bir (%81,5) hasta iyileşti. Olguların 21'i Neer tip 1, 10'u Neer tip 2 ve 6'sı Neer tip 3 idi. Neer tip 4 olarak sınıflandırılan bir hastada kırık gelişti. Üç hastada 3. enjeksiyondan sonra deride renk değişiklikleri görüldü. İki hastada (%5) üst ekstremite uzunluk eşitsizliği olduğu tespit edildi.*

Tartışma: *Düşük maliyet ve komplikasyon oranı ve kısa hastanede kalış, metilprednizolon enjeksiyonu ile humerus basit kist tedavisinin popülaritesini arttırmıştır. Farklı uygulama şekilleri ile, bir ay aralıklarla 3 metilprednizon tedavisi çok etkili bir yöntemdir.*

Anahtar kelimeler: *kemik kisti, humerus, basit kemik kisti, steroid enjeksiyonu*

INTRODUCTION

Simple bone cysts are fluid-filled, slow progressing, benign bone lesions [1,2]. The majority form in the childhood period (4-10 years) and are localized on the metaphysis of the long bones [3]. The most common locations are proximal humerus and proximal femur [4]. The incidence in male children is higher than in female children [5]. They comprise 3% of bone-sourced tumors [5].

Simple bone cysts were described for the first time in 1876 by Virchow [6]. Their etiology is still unknown [7,8]. As they are rarely observed in adults they are known as self-limiting lesions; however they may cause repeated pathologic fractures and growth disturbance, skeletal deformity linked to growth plate damage [9,10].

The first treatment method used was curettage and grafting [11]. However high recurrence risk after sur-

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Yazışma adresi: Uzm. Dr. Murat Çakar, Sağlık Bilimleri Üniversitesi, Okmeydanı Eğitim ve Araştırma Hastanesi, Ortopedi ve Travmatoloji Kliniği, İstanbul, Türkiye
e-posta: drmuratcakar@gmail.com

gery and complications linked to surgery were reported [11,12]. To reduce these complications many methods were described [13-17]. These include injections (steroid, autogenous bone marrow, demineralized bone matrix), multiple drilling and flexible intramedullary nailing [18-20]. The aim of all treatments is to prevent pathologic fractures and shortening and ensure early mobility of the patient [21].

In our study we aimed to evaluate the efficacy of 3 steroid injections at monthly intervals for simple humerus cysts.

MATERIAL and METHOD

This study retrospectively evaluated patients with simple humerus cyst identified and treated with steroid injections at two separate orthopedic clinics in Istanbul between January 2010 and January 2015. Thirty-eight patients were included in the study. Patients with fracture when the cyst was identified were administered injections after 4-6 weeks conservative treatment with a cast.

Injections were given to all patients three times under general anesthesia at monthly intervals. Two bone marrow aspiration needles were inserted proximal and distal of the cyst under fluoroscopy control. The cyst contents were aspirated and contrast material was used to check whether there was a single cavity or not. The cavity was washed with physiologic serum, 80 mg/ml steroid was administered and the bone marrow aspiration needles removed. A pressure bandage and arm sling was used and movement was begun. For cysts with more than one cavity, the procedure was repeated for each cavity.

Patients were called for check-up at the 1st, 2nd, 3rd, 6th, 9th and 12th months. Later, yearly check-ups were performed. Results were radiologically assessed with humerus AP and lateral graphics (Figure 1,2). On graphics the cyst width, length, depth and distance from growth plates were measured. Cyst activity was classified as active or latent according to Jaffe and Lichtenstein [22]. Cysts closer than 10 mm to growth plates were assessed as active, while those more distant were latent. Healing was assessed according to

Figure 1. Preoperative AP view of simple bone cyst.

Figure 2. Postoperative 6th month AP view of the simple bone cyst of the same patient.

the Neer classification, first described by Neer and modified by Chang (Table 1). Extremity length difference was assessed as equal if the difference was less than 2 cm, according to AO Foundation guidelines. Clinical results were assessed with the Child Health Assessment Questionnaire (C-HAQ) completed by the patients' parents with function and pain evaluated. The best score on C-HAQ is 0 with the worst score 3.

Table 1. Modified Neer Classification System for radiological evaluation of unicameral bone cysts.

Healed	Cyst filled by formation new bone with or without small static, radiolucent areas less than 1 cm size.
Healing with defect	Static, radiolucent areas less than 50% of the diameter of the bone with enough cortical thickness to prevent fracture.
Persistent cyst	Radiolucent areas greater than 50% diameter of the bone and with a thin cortical rim. No increase in cyst size.
Recurrent cyst	Cyst reappeared in a previously obliterated area or a residual radiolucent area has increased in size.

RESULTS

A total of 38 patients, 20 girls (53%) and 18 boys (47%), were included in the study. Mean age was 7.8 years (4-14). Eleven cysts (29%) were active and 27 (71%) were latent. In 17 lesions (45%) there was more than one cavity, while 21 (55%) patients had only one cavity. In 13 patients (34%) there was a fracture present when the cyst was first identified. Ten patients applied because of pain, while in 15 patients the cyst was incidentally identified. The demographic data of patients is given in Table 2.

Patients were monitored for a mean of 32 months (12-60). Thirty-one patients (81.5%) fully recovered (Figure 3,4). Of these 21 (55%) were type 1 on Neer classification with no residual lesion, 10 (26%) were type 2 on Neer classification with residual lesion, 6 patients (16%) were classified as Neer type 3. In 1 patient (3%) with Neer type 4, fracture developed. The mean function score on the Child Health Assessment Questionnaire (C-HAQ) was 0.6 (0-2) with mean pain score of 0.7 (0-2.1). Three patients (8%) developed skin color changes after the 3rd injection. Two patients (5%) were identified to have upper extremity length inequality.

Table 2. Patients' demographic data.

	age	m/f	Fracture when cyst identified	active / latent	single / multiloculate
p1	4	M		A	S
p2	7	F	yes	L	S
p3	6	F		L	S
p4	11	M	yes	L	M
p5	14	M		L	M
p6	6	F	yes	A	M
p7	8	M		A	S
p8	5	M	yes	L	M
p9	6	F	yes	L	M
p10	9	F		L	M
p11	8	M		L	S
p12	7	F	yes	A	S
p13	10	F		L	S
p14	13	M		L	S
p15	11	M		L	S
p16	9	F		L	S
p17	8	M	yes	L	M
p18	5	F	yes	A	M
p19	6	F		L	S
p20	8	F		L	M
p21	4	M	yes	A	S
p22	6	F		A	S
p23	5	M		A	M
p24	12	M		L	M
p25	9	M		L	S
p26	10	F		L	M
p27	13	M		L	S
p28	7	F	yes	L	M
p29	6	F		L	M
p30	8	M	yes	L	S
p31	9	F		L	M
p32	4	F	yes	A	S
p33	5	F		A	S
p34	7	M		L	S
p35	6	M		L	M
p36	10	F	yes	L	S
p37	8	F		L	S
p38	9	M		A	M

DISCUSSION

The first method applied for treatment of simple bone cysts was curettage and grafting [11]. Though nearly 90% successful results were obtained, this invasive method may result in infection, scars, keloids, growth plate damage, and linked to this, length differences and angular deformities [21,23]. After surgery, 40% cyst recurrence was observed. As a result, as less invasive interventions reduced the complication rate and hospital stay, patients and relatives chose these.

Steroid injection treatment described by Scaglietti et al. [24] they reported 76% failure after a single injection of intra-cyst steroid injection treatment. Campanacci et al. [1] achieved 64% success after 3-4 injections over a 12-20 month period. Palma and Santucci

Figure 3,4. Clinical view of the patient showing full range of motion at 9 months.

[25] reported 94% success after 2-5 injections at two month intervals. In a study retrospectively comparing steroid injections with bone marrow injections, Cho et al. [3] achieved 86.7% success with 1-6 injections over a 4-23 month period. Pavone et al. [21] reported 65.2% success after 2-5 injections within a 2-6 month period. While the success of a single injection is low in the literature, after multiple injections there is increased success. Though studies use the number of injections and duration between them as variables, there is no study administering 3 injections to patients at monthly intervals.

The 38 patients in our study were administered 3 injections at monthly intervals and patients were followed-up for 32 months (12-60). Recovery was provided for 31 patients out of the 38 (81.5%). According to Neer classification, 21 (55%) were type 1 without residual lesion, and 10 (26%) were type 2 with residual lesion. Only 3 patients (8%) experienced skin color changes and 2 patients (5%) had upper extremity length inequality identified, while 1 patient (3%) developed fracture. When evaluated with the Child Health Assessment Questionnaire (C-HAQ), clinical results were very good in terms of both function and pain scores. The mean function score was 0.6 (0-2) and the mean pain score was 0.7 (0-2.1).

There are some strengths and limitations of this study: The form like 3 times injections at one-month intervals were not studied in the literature. In this paper, show that 3 times injections at one-month intervals is a very effective method. The findings of this research are based on the small number of patients.

CONCLUSION

The low rate of complications and short hospital stay mean that intra-cyst steroid injections are a common method for treatment of simple humerus cysts. In our study the results obtain by using 3 steroid injections at monthly intervals were clinically and radiologically very good. Assimilar results are obtained when compared with the literature, it is a useful method.

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