



Costochondral Chest Pain with Swelling Can Be Treated with Rib Resection

Kostokondral Şişlikle Birlikte Olan Göğüs Ağrısı Kosta Rezeksiyonu İle Tedavi Edilebilir

Cumhur Murat Tulay¹, Sadık Yıldız¹

¹Manisa Celal Bayar University, Department of Thoracic Surgery, Manisa, Turkey

Abstract

Objective: To show effects and results of costochondral rib resection due to prolonged chest pain together with swelling without underlying disease.

Material-Method: This retrospective study was comprised 14 patients with intractable costochondral pain, swelling and tenderness upon palpation, without any other problems. The time between the onset of intractable chest pain and surgery ranged from 14 to 60 months. Whole-body bone scintigraphy and thorax computed tomography were used for imaging. Costochondral rib resection was performed. Numerical pain rating scale (NRS) was done to determine the effectiveness of surgery before and 2 weeks after operation. Pain scales were evaluated by non-parametric Mann-Whitney U test.

Results: Increased focal activity was diagnosed for the chondral parts of the ribs in three patients scintigraphically with normal tomographic findings. Pathologically, enchondroma was identified in two patients and low grade chondrosarcoma in one patient. In all patients pain relief was achieved 1-2 weeks after surgery. The mean postoperative pain score was 0.64 while preoperative one was 9 ($p \leq 0.05$).

Conclusions: After surgical resection elimination of both swelling and pain had very high patient satisfaction. We believe that intractable costal pain with swelling that is not curable by any known means shall be resected but more studies are needed.

Keywords: Costochondral Pain, Costochondral Swelling, Non-Cardiac Thoracic Pain

Özet

Amaç: Altta yatan başka bir hastalık olmadan, şişlik ve uzamış göğüs ağrısında kostokondral kaburga rezeksiyonunun etki ve sonuçlarını incelemek.

Materyal-Metod: Retrospektif çalışmaya dayanılmaz kostokondral göğüs ağrısı, şişlik ve palpasyonla hassasiyet bulunan ve altta yatan başka problemi olmayan 14 hasta dahil edildi. Devam eden göğüs ağrısının başlangıç zamanı ile cerrahi arasındaki zaman 14-60 ay arasındaydı. Tüm vücut kemik sintigrafisi ve toraks bilgisayarlı tomografi görüntüleme için kullanıldı. Sayısal ağrı skalası (NRS), cerrahi etkisini göstermek için cerrahi öncesi ve cerrahiden 2 hafta sonra yapıldı. Ağrı seviyeleri non-parametrik Mann-Whitney U testi ile değerlendirildi.

Bulgular: Normal tomografik bulguları olan 3 hastada, sintigrafik olarak kaburgaların kondral kısımlarında fokal artmış aktivite tespit edildi. Patolojik olarak 2 hastada encondroma tespit edilirken, 1 hastaya düşük grade kondrosarkoma tanısı kondu. Tüm hastalarda cerrahiden 1-2 hafta sonra ağrı yönünden rahatlama oldu. Ortalama postoperatif ağrı skoru 0.64 iken, preoperatif değer 9 olarak bulundu ($p \leq 0.05$).

Sonuçlar: Cerrahi rezeksiyon sonrası şişlik ve ağrının ortadan kalması yüksek hasta memnuniyetine sebep olmuştur. Bu konuda daha fazla çalışmaya ihtiyaç olmasına rağmen, diğer yöntemlerle tedavi edilemeyen şişlikle beraber devam eden dayanılmaz göğüs ağrısında, rezeksiyonun fayda sağlayabileceğine inanıyoruz.

Anahtar Kelimeler: Kostokondral Göğüs Ağrısı, Kostokondral Şişlik, Nonkardiyak Göğüs Ağrısı

Introduction

Chest pain is one of the most common symptom requiring medical attention in an outpatient setting. Non-traumatic chest pain is a common symptom in young people and a serious etiology is really uncommon. Cardiac and pulmonary problems are usually the focus of attention of an initial diagnostic evaluation. When these are excluded, conditions that affect the musculoskeletal structures of the chest wall are frequently considered as potential causes of atypical or

noncardiac chest pain (1, 2).

Costochondral pain is a common cause of emergency service admission for a patient with chest pain. A study of chest pain in an outpatient adolescent clinic reported that 31% adolescents had musculoskeletal causes (3, 4). Palpation of the chest wall is required to determine the location of pain. Costochondral tenderness and pain with or without swelling are among the important clues for a physician. Costal resection has been performed for some diseases, particularly in patients with

lung cancer with chest wall involvement. The authors could not find any study in the literature about performed surgery for longterm pain and swelling at costochondral rib portion without known pathology. In this study, we sought to explain the results of costochondral rib resection that was performed due to prolonged intractable chest pain together with swelling in patients without any known underlying disease.

Material-Methods

This retrospective study was conducted from January 2009 to June 2013. From database of thoracic surgery clinic, 54 patients with thoracic wall pathology who underwent surgery were found. We excluded 40 of these 54 patients who had infectious conditions, thoracic wall injuries caused by a gunshot and/or a bomb, neoplastic conditions of lung cancer with thoracic wall involvement, and metastasis being a reason for rib resection. Fourteen (25.9%) of the included patients (8 females, 6 males) had costochondral pain, including swelling and tenderness upon palpation, without any other problems.

Mean age of the patients was 21.5 years (range 15-32 years). The time between the onset of chest pain and surgery ranged from 14 to 60 months.

All patients had been taking pain-killers, muscle relaxants and also topical anesthesia patch properly for symptoms of chest pain, but without any response. Rheumatological investigations including erythrocyte sedimentation rate, rheumatoid factor, anti-cyclic citrullinated peptide (CCP) antibodies, C-reactive protein, antinuclear antibody had been done before and no disease had been found. Whole-body bone scintigraphy and thorax computed tomography were used for imaging. Three-phase bone scintigraphy was performed for all patients with additional whole body imaging. Bone scintigraphy was performed using intravenous administration of approximately 20 mCi (750 MBq, based on body weight) of 99 m-Tc methylene diphosphonate. Dynamic and static imaging were performed just after administration of this radiopharmaceutical and 2–3 hours after administration, respectively, using a gamma camera equipped with a parallel-hole, low-energy, high-resolution collimator (GE, Infinia 2, Israel).

Informed consent was obtained from all patients and their relatives. Costochondral rib resection with a macroscopically safe area, which was about 2 cm away from any macroscopic pathology, was performed for all patients under general anesthesia. Thoracic wall reconstruction was not required after costochondral resection. Pathologic examinations were performed in our hospital using hematoxylin–eosin and Ki-67 immunohistochemistry. If needed, specimens were sent for consultation with another pathologist at another hospital. Patients were followed for at least 1 year after surgery. Numerical pain rating scale (NRS) which rate the intensity of their current pain on a scale of 0 ‘no pain’ to 10 ‘worst possible pain’ was used to determine the effectiveness of surgery before and 2 weeks after operation. All patients were asked to make three pain ratings, corresponding to current, the best and the worst pain experience over the past 24 hours. The average of the 3 ratings was used to represent the

Figure 1a. Enchondroma-left second costochondral activity

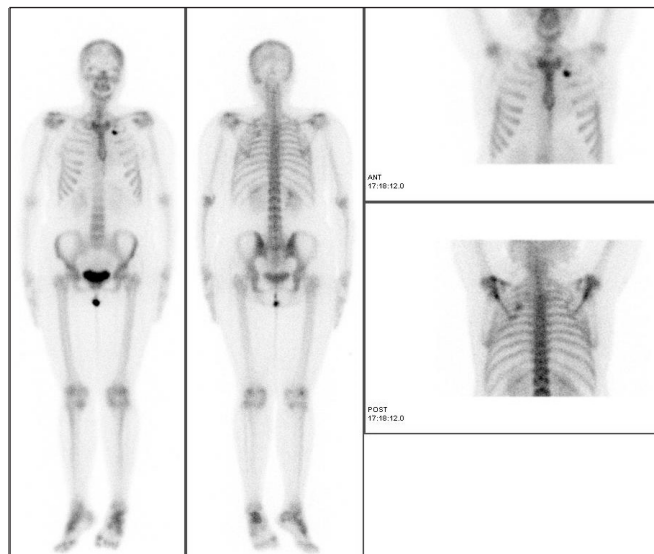


Figure 1b. Enchondroma without scintigraphic activity

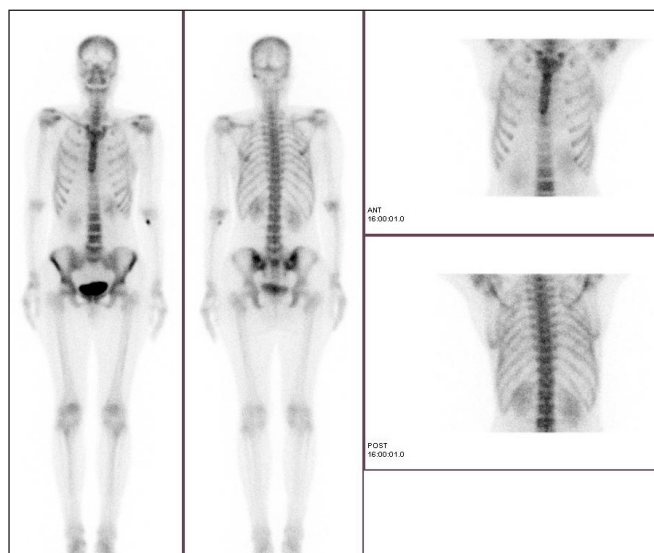


Figure 2. Preoperative and postoperative mean of pain scores

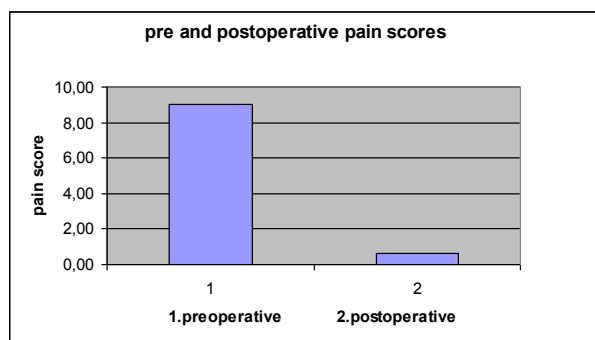


Table 1. Patients' characteristics

Case	Age	Gender	Location / Trauma history / Pain duration	Scintigraphy	Tomography	Pathology
1	19	Female	Right fourth cc* Trauma (+) 36 months	Normal	Normal	3x1x1cm ossified cartilaginous tissue
2	17	Female	Right fourth cc 42 months	Normal	Normal	4x1.5x0.7cm mature Cartilaginous tissue
3	25	Male	Right second cc Trauma (+) 20 months	Normal	Normal	3.5x1x1cm regenerating cartilage
4	22	Female	Right third cc 20 months	Normal	Normal	3x1x1cm cartilaginous tissue
5	17	Female	Right fourth cc 16 months	Normal	Normal	4x1x1cm cartilage with focal hypocellularity
6	15	Male	Left fourth cc Trauma (+) 26 months	Normal	Normal	4x1.2x1.5cm cartilaginous tissue
7	21	Male	Right second cc Trauma (+) 46 months	Normal	Normal	3x1x1.5cm cartilage with focal hypocellularity
8	22	Female	Right second cc 15 months	Normal	Normal	3.5x1.5x0.8cm cartilaginous tissue
9	20	Male	Right second cc Trauma (+) 24 months	Normal	Normal	3x2x2cm enchondroma
10	22	Male	Right second cc 60 months	Focal increased activity at right second rib	Normal	5x1.5x1.5cm ossified cartilaginous tissue
11	19	Female	Left fourth cc 44 months	Focal increased activity at left fourth rib	Normal	5.5x1.5x1.5cm ossified cartilaginous tissue
12	21	Male	Left third cc 14 months	Normal	Expansile deformity at left third rib	5.5x2x2cm hyperchromatic-pleomorphic atypical chondrocytes, myxoid changes and binucleation. Grade I chondrosarcoma
13	32	Female	Right fourth cc Trauma (+) 17 months	Normal	Normal	2.5x1.1x1.5cm mature cartilage
14	30	Female	Left second cc 22 months	Focal increased activity at left second rib	Normal	4.5x2x2.5cm enchondroma

*cc: costochondral portion of the rib

patient's level of pain over the previous 24 hours. Pain scales were evaluated by non-parametric Mann-Whitney U test.

Results

Included 14 (25.9%) patients (8 females, 6 males) had costochondral pain, including swelling and tenderness upon palpation, without any other symptom. A history of trauma was recorded for six patients and none of them reported any costal fractures. All patients had intractable chronic chest pain without any underlying disease that continued for more than a year (range, 14–60 months).

Ten of the 14 patients had normal tomographic, scintigraphic, and pathological findings. Late phase scintigraphic uptake was observed in three patients. Increased focal activity was diagnosed for the chondral parts of the ribs in three patients scintigraphically with normal tomographic findings (Fig. 1 a-b). Pathologically, enchondroma was identified in two patients and low grade chondrosarcoma in one patient. An expansile chondral deformity was detected via tomography only in one patient with normal scintigraphic findings who had a low grade chondrosarcoma. Scintigraphic activity

was positive in only one enchondroma patient with normal tomographic findings. Ossified cartilage tissues were observed in two patients who had increased focal activity (Table 1).

No mortality or morbidity was recorded during the intra- and post-operative periods. The pleura was intact in all patients, and chest tube drainage was not used. Patients were discharged from the hospital the day after surgery. Patients were then followed in our thoracic surgery clinic for at least one year. Only one patient who had a low grade chondrosarcoma wanted to continue his treatment in the city in which he lived. Nonsteroidal anti-inflammatory drugs and myorelaxant-paracetamol combination were given to patients during the post-operative period. Pain relief was achieved 1-2 weeks after surgery in all patients and pain killers were stopped.

Numerical pain rating scale (NRS) which was used to determine the effectiveness of surgery showed that the mean postoperative pain score was 0,64 while preoperative one was 9 ($p \leq 0.05$) (Figure 2).

Discussion

Chest wall pain causes a significant loss of health-related

quality of life if diagnosis and treatment are delayed. Patient anxiety increases when the diagnostic process is prolonged. A rapid diagnosis and appropriate management can prevent these social and health-related problems. During chest examinations, the costal margins are ignored and not specifically evaluated. The presence of tenderness, diffuse enlargement, or focal masses may occasionally provide important diagnostic information to an alert observer.

Treatment is usually directed toward pain relief using acetaminophen, nonsteroidal anti-inflammatory drugs (when safe and appropriate), or other analgesics. Applying heat with compresses or heating pads can help, particularly for cases of muscle overuse. Minimizing activities that provoke these symptoms (e.g., reducing the frequency or intensity of exercise or work activities) or using cough suppressants may also help in symptom relief (5). Physical therapy has also been used for musculoskeletal chest pain (6).

Focal masses at the costal cartilages may indicate primary or secondary malignancies, traumatic sequelae, or infectious inflammatory processes. Costochondritis has been previously reported to be diagnosed in 14%–30% patients with chest pain who presented to physicians (7). Bone scintigraphy has proved to be effective for determining the presence and extent of costochondral involvement. Costochondritis is often confused with Tietze's syndrome, which is a similar but a rarer disorder involving swelling of a single costal cartilage, usually of the second rib (1).

Costochondritis is defined as inflammation of the costochondral junctions of the ribs or chondrosternal joints, usually at multiple levels and without swelling or induration. The course of this condition varies, as it can last from weeks to months, but it usually abates within a year. One prospective study found that one-third of the patients had persistent chest wall tenderness at one year (6). Pain is reproduced by palpation of the affected cartilage segments and may radiate to the chest wall. Surgical excision is generally required because of poor blood supply to costal cartilages so that use of antibiotics alone is often ineffective (8).

Tietze's syndrome is an inflammatory process that causes a visible enlargement of the costochondral junction. It occurs in a single rib 70% of the time and usually within the costal cartilages of ribs two to three, predominantly in rib two (4). Costochondritis and Tietze's syndrome can be diagnosed via a clinical examination and bone scintigraphy. Although one of the possible differential diagnoses was Tietze's syndrome, in this study, we did not diagnose this in any of the patients.

Chondrosarcoma may occasionally arise in the costal cartilages. Approximately 10% chondrosarcomas occur in the thoracic cage; its characteristic appearance is an expansile mass with coarse calcifications and an associated soft tissue mass. Its growth is often slow (9, 10). We determined an expansile costochondral lesion upon palpation and tomography without calcification.

Intercostal neuritis is caused due to compression of nerve in thoracic rib cage. These nerves lie between the ribs and any sort of damage to one of the nerves results in intercostal

neuralgia. All of our patients had long term swelling in the costochondral region. We think that perhaps the cause of the pain was due to nerve compression which occurs in costochondral region.

We performed costochondral rib resections for 14 patients who had chest pain that was unresponsive to medication and/or physical therapy. All patients had intractable pain together with swelling at the costochondral parts of their ribs for a long time (pain duration, 14–60 months). While there were normal tomographic and scintigraphic findings for 10 of the 14 patients, computed tomography imaging showed an expansile costochondral lesion in one patient who had a low grade chondrosarcoma without scintigraphic activity. Scintigraphic positive uptake was observed in only one enchondroma patient, while the other did not show scintigraphic activity.

Although bone scintigraphy is a sensitive method for most bone pathologies, it is usually not sufficiently specific for diagnosis (11). For our cases, increased focal activity was diagnosed for the chondral parts of the ribs in three patients, and only one of them had an enchondroma. We believe that although bone scintigraphy is important for bone pathologies, it may not be an effective diagnostic tool for costochondral pathologies.

Treatment strategies for musculoskeletal chest pain are heat compress, minimizing activities which aggravate pain, nonsteroidal antiinflammatory drugs, physical therapy and local anesthetic/ corticosteroid injection(1, 12-14). Regular and long term analgesic usage and physical therapy were recorded for all of the patients without response. Local injection had been applied 6 of 14 patients, recurrence were observed. Although local analgesic/ corticosteroid injection is an effective method for costochondral chest pain, recurrence is an important problem (14).

Chest pain, in particular, adversely affects the lives of people due to a fear of death and also affects their health-related quality of life. Most people believe that if they have recurrent anterior chest pain, it is probably related to a heart attack. A study of chest pain in an outpatient adolescent clinic reported that 31% adolescents had musculoskeletal causes (3, 4). Palpation of the chest wall may cause costochondral tenderness and pain. Pain accompanied by swelling could provide important clues for physicians. Palpation is required to determine the location of pain. All doctors should thus palpate the chest wall of patients with chest pain, particularly young patients.

As a result of costochondral resections, it was pathologically established that two patients had enchondroma and one had chondrosarcoma. The patient with chondrosarcoma had pain for 14 months. One of the two patients with enchondroma had pain for 22 months, and the other had pain for 24 months. Computed tomography showed an expansile costochondral lesion only in the patient with chondrosarcoma, whereas no costochondral pathology was identified in other patients. Bone scintigraphy showed involvement in one patient who was pathologically diagnosed with enchondroma and in

two patients who were diagnosed with ossifying cartilages. If the patient who was diagnosed with chondrosarcoma had been followed-up under analgesic treatment only for the pain that lasted for 14 months, metastases could have developed and the option for surgical intervention would have been reduced. Therefore, we recommend surgical resection for costochondral swellings associated with long-term chest pain, even if the results of bone scintigraphy and tomography are considered normal. We believe that future studies should investigate the time of costochondral resection for patients with costochondral pain that does not respond to medical treatment. Although we found pathologically proven conditions as enchondroma and chondrosarcoma in 3 patients, we could not identify any pathology in some patients. We think that costochondral swelling with pain might be resulted from undetected fractures or separations.

Pain relief was achieved 1-2 weeks after costochondral resection. All patients were followed-up for at least a year after surgery in our thoracic surgery clinic, except for the patient with chondrosarcoma. These patients stated that they did not need to use pain killers 1-2 weeks after surgery, without any loss in health-related quality of life. The results of numerical pain rating scale (NRS) were statistically significant. This study might be the first one which showed the effectiveness of costochondral rib resection on account of longterm swelling and pain without any underlying or known etiology. Patients who admitted to our thoracic surgery clinic with pain and swelling at costochondral portion of rib had been suffered from pain at least 14 months. All of them had been taking regular analgesic treatment with or without physiotherapy, but none of them had any response to pain killers. If the patients said that we had only pain, we would not perform this kind of surgery. The importance of our study was that patients suffered from pain and swelling and they have been free of pain after surgery.

Conclusion

After surgical resection elimination of both swelling and pain had very high patient satisfaction. We believe that intractable costal pain with swelling that is not curable by any known means shall be resected but more studies are needed.

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