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Case Report / Olgu Sunumu

Treatment of Pott's Puffy tumor with balloon sinuplasty: report of three cases

Pott's Puffy tümörünün balon sinüplasti ile tedavisi: Üç olgu sunumu

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Pott's Puffy tumor (PPT) is a rare entity characterized by subperiosteal abscess associated with osteomyelitis of the frontal bone. It is usually managed by surgical curettage of the osteomyelitic bone and long-term antibiotic therapy. Balloon catheter dilatation is a new technique which was recently introduced for the treatment of chronic rhinosinusitis. In this article, we present three PPT cases (two of them were secondary to endoscopic sinus surgery) who were successfully treated with balloon catheter dilatation and long-term antibiotherapy.

Key Words: Balloon dilatation; frontal sinusitis; osteomyelitis.

Pott's Puffy tümörü (PPT), frontal kemik osteomiyeliti ile ilişkili subperiosteal apseyle karakterize nadir görülen bir patolojidir. Hastalık genellikle osteomiyelitik kemiğin küretajı ve uzun süreli antibiyoterapi ile tedavi edilir. Balon kateter dilatasyonu, kronik rinosinüzit tedavisinde son zamanlarda kullanılan yeni bir tekniktir. Bu yazıda, balon kateter dilatasyonu ve uzun süreli antibiyoterapi ile başarılı bir şekilde tedavi edilen üç PPT olgusu (olguların ikisi endoskopik sinüs cerrahisine ikincil gelişmiştir) sunuldu.

Anahtar Sözcükler: Balon dilatasyon; frontal sinüzit; osteomiyelit.

Pott's Puffy tumor (PPT) is an infrequent entity characterized by subperiosteal abscess associated with osteomyelitis of the frontal bone manifested by pain, tenderness and swelling of the soft tissues of the forehead region.[1-3] It is usually seen as a complication of frontal sinusitis or trauma.[1] Early diagnosis and aggressive treatment are essential because of high risk of severe neurological complications, such as epidural abscess, subdural empyema and secondary septic thrombosis of the dural sinuses.[4] Generally accepted treatment for this entity is surgical curettage of the osteomyelitic bone, drainage of abscess, excision of the periosteal granulation tissue and long antibiotic therapy.[2,5]

Balloon catheter dilatation is a new technique that was recently introduced for the treatment of chronic rhinosinusitis (CRS).[6] It is especially useful in frontal sinus surgery, helping to dilate the outflow tract of the sinus.[7] Hopkins et al.[8] has recently reported that balloon catheter dilatation may be the ideal technique for achieving drainage

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Figure 1. *Hyperemic swelling in the frontal region (Case 1).*

Figure 2. *Axial computed tomography: soft tissue swelling on the frontonasal region and bone erosion of anterior wall of the frontal sinus (Case 1).*

of an acutely infected frontal sinus when surgical intervention is required.

This manuscript presents three PPT cases successfully treated with balloon catheter dilatation technique and long-term antibiotics.

CASE REPORT

Case 1– A 52-year-old male patient was admitted to our hospital with the complaint of swelling of forehead, headache, purulent nasal discharge and fever for 15 days. His medical history revealed that he had recurrent episodes of sinusitis for three years.

On physical examination his body temperature was 37.9 °C, his middle turbinates were hypertrophic, there was purulent drainage and edema in his right middle meatus region and the nasal septum was deviated to the left. In the frontal region there was a hyperemic, tender and fluctuant swelling that was 3 cm in diameter (Figure 1). There was no neurologic deficit.

Computed tomography (CT) scan revealed sclerosis and thickening compatible with osteomyelitis on the right frontal sinus wall, soft tissue appearance in the sinus suggesting a fluid collection, a large defect on the anterior wall of the sinus and soft tissue swelling under the skin. The right frontal recess was obliterated and there was loss of aeration in the right maxillary and ethmoid sinuses. His left frontal sinus was hypoplastic (Figure 2, 3).

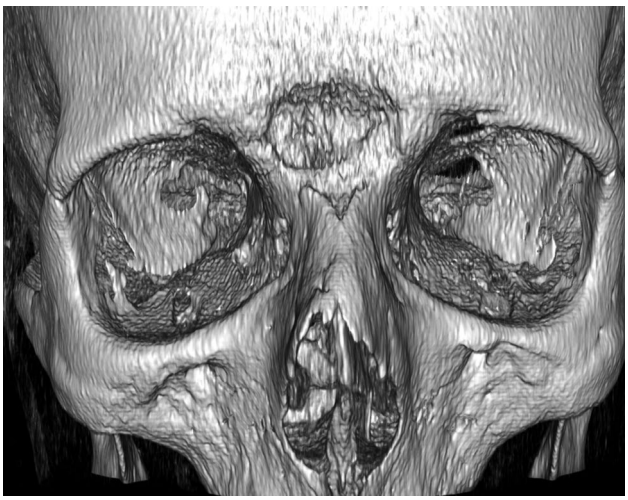

Figure 3. *Three dimentional (3D) Reformat showing the frontal sinus anterior wall defect (Case 1).*

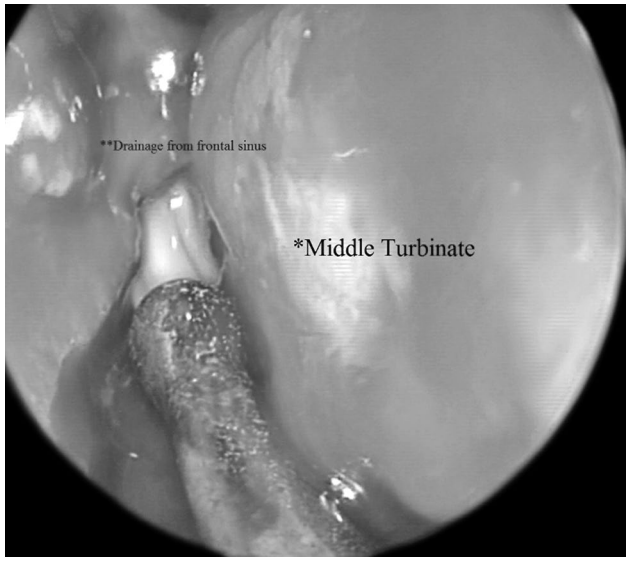

Figure 4. *Purulent drainage from right frontal sinus ostium (Case 1).*

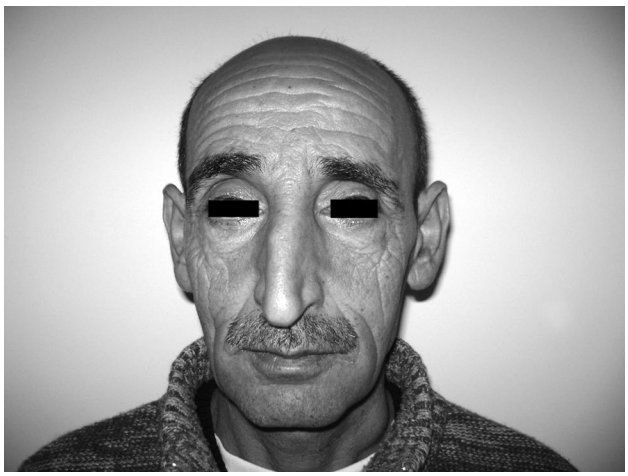

Figure 5. *Patient's picture three months later (Case 1).*

Figure 6. *Axial computed tomography: soft tissue swellings were subsided and the skin was retracted over the eroded bone (Case 1).*

Laboratory tests revealed a white blood cell count of 20.000 μl and a C reactive protein (CRP) level of 95 mg/l.

The patient was hospitalized and parenteral empirical antibiotic treatment was started (ceftriaxone plus metronidazole). Following three days of antibiotic treatment, the patient was operated under general anesthesia. After the right frontal sinus ostium was dilated with a balloon catheter, a large amount of pus was drained (Figure 4). The samples were collected for culture. The sinus was irrigated with antibiotic-containing saline solution. The right maxillary ostium was also dilated by balloon catheter and right ethmoidectomy was also performed. The frontal sinus was irrigated with antibiotic solutions by guide catheter for five days after surgery, and parenteral antibiotic treatment was continued for three weeks. Since a positive culture was not obtained, intravenous treatment was continued empirically. The patient's clinical findings improved and he was discharged from hospital with oral ciprofloxacin given for six weeks. The patient remained asymptomatic and the endoscopic examination revealed patent sinus ostia on the follow-up examinations performed at three, six and nine months after the surgery (Figure 5). A control CT obtained 10 months later revealed that the soft tissue swelling in the frontal region had subsided and the skin was retracted over the eroded frontal bone (Figure 6).

Case 2– A 41-year-old male patient was admitted to our hospital with the complaint of headache, postnasal discharge and nasal obstruction. History revealed that he had undergone an endoscopic sinus surgery (ESS) for chronic rhinosinusitis six months ago. He had headache for 10 days and fever for three. There was also a progressively increasing swelling on the forehead. He had no previous history of head trauma.

On physical examination there was a 3x3x1.5 cm sized tender and fluctuant swelling on the forehead. Nasal endoscopic examination revealed edematous middle meatus and nasal mucosa, and purulent nasal discharge. Middle turbinates were edematous on both sides. Neurological examination was normal. White blood cell (WBC) count was 14.000 μl and CRP was 75 mg/l.

Computed tomography examination revealed loss of aeration especially in the right frontal sinus. There was a dense fluid collection reminiscent of abscess which eroded the anterior wall of the frontal sinus and extended subcutaneously to the nasal dorsum. The subcutaneous tissues in the frontal region were thicker due to inflammation. The uncinate process and anterior ethmoidal cells were defective due to previous ESS (Figure 7a, b).

The patient was hospitalized and parenteral antibiotic treatment similar to the previous case was started. On the sixth day the patient was operated under general anesthesia. Ostial dilatation of frontal sinuses was performed by balloon catheter and a large amount of purulent material was drained from the frontal sinus. Samples were obtained for culture. The frontal sinus was irrigated with antibiotic-containing solutions and this process

Figure 7. ***(a)*** *Axial computed tomography demonstrating the abscess extending to subcutaneous region of the right nasal dorsum (Case 2).* ***(b)*** *Coronal computed tomography demonstrating the subcutaneous abscess and erosion of the anterior wall of the right frontal sinus (Case 2).*

was repeated for five days. Culture of pus failed to grow any organism, so empirical parenteral antibiotic treatment was continued for four weeks and the patient was discharged from hospital with oral antibiotics. Control CT scan obtained after 11 months revealed that the soft tissue swellings had disappeared while the erosion in the bone remained.

Case 3– A 50-year-old female patient admitted to our hospital with the complaint of headache and swelling on her forehead and periorbital region. Her medical history revealed that she had undergone an ESS for chronic rhinosinusitis eight months ago. Headache and a swelling on the forehead had begun one week ago and progressed gradually.

On physical examination there was a fluctuant, erythematous and tender swelling on the right forehead and periorbital region. Nasal endoscopic examination revealed granulation tissue in the right frontal recess, edematous nasal mucosa and purulent nasal discharge. Neurological examination, visual acuity and eye movements were normal. Her temperature was 37.5 °C, WBC was 12.500 μl and CRP was 50 mg/l.

Computed tomography revealed loss of aeration and air-fluid levels in both frontal sinuses. Secretions obliterated the frontal recesses. There was erosion on the orbital roof (inferior wall of the frontal sinus) and soft tissue swelling under the skin on the right side. There was increased heterogeneity resembling inflammation in orbital fatty tissue. The uncinate process and anterior ethmoidal cells were defective due to previous ESS (Figure 8).

The patient was hospitalized with the diagnosis of PPT and parenteral antibiotic treatment was started (ceftriaxone plus metronidazole). The patient was operated on the third day under general anesthesia. The right frontal ostium was

Figure 8. *Coronal computed tomography showing erosion in the bone in the orbital roof of inferior wall of frontal sinus on the right side and inflammation in the palpebral tissue (Case 3).*

dilated by balloon catheter and mucopurulent drainage was aspirated, then frontal sinus was irrigated with antibiotic-containing saline solution. Samples were taken for culture before irrigation. Since no positive culture was obtained, intravenous antibiotic treatment was continued empirically.

Postoperative period was uneventful with parenteral antibiotic treatment and the patient was discharged from hospital after four weeks, on oral ciprofloxacin for six weeks. The patient was asymptomatic and the endoscopic examination revealed patent sinus ostia on the follow-up examinations performed at three, six and nine months after the surgery. The patient was disease free on CT control that was obtained 11 months later.

DISCUSSION

The presenting symptoms and signs of PPT are headache, fever, purulent or non-purulent rhinorrhea, periorbital swelling, fluctuant and tender swelling over the frontal region. The differential diagnosis includes skin and soft tissue infection, infected hematoma as well as benign and malignant tumors of the skin, soft tissue, bone and frontal sinuses.[1] In suspected cases, appropriate imaging by CT or MRI should be performed to diagnose and evaluate possible complications. Characteristics of PPT on CT scan are opacification of the frontal sinus with possible bony destruction of the anterior wall and pericranial fluid collection. Owing to recent advances in multidetector computed tomography (MDCT) technology diagnosis can be established in a relatively short time. Vascular structures and venous sinuses can be evaluated within the same session by contrast enhanced MDCT and thus thrombophlebitis and thrombi can be detected. It can also aid in the determination of osteomyelitis by showing the bony structures better than MRI as well as enabling evaluation on axial, sagittal and coronal plans.[9] In our three cases the diagnosis were confirmed by the frontal wall erosion of the sinuses and signs of osteomyelitis on MDCT. The proximity of the frontal sinus to the anterior cranial fossa necessitates the prompt diagnosis and aggressive treatment of PPT because of the high frequency of intracranial complications.[5,10] Surgical drainage remains the treatment of choice, followed by prolonged antibiotic therapy (6-8 weeks).[4] Before the advent of ESS the literature supported a graduated approach progressing from minimal to more invasive procedures.[10] Conventional surgical methods include trephination, frontal sinus drainage by the way of external ethmoidectomy and craniotomy with standard bicoronal incision depending on the extent of the disease.[1,10] Endoscopic sinus surgery is a widely accepted effective method to relieve sinus ostial obstruction and to treat the annoying problems of rhinosinusitis in the past 20 years. At present endoscopic frontal sinusotomy has been successfully performed in complicated frontal sinus inflammatory diseases,[11] and recently even in the existence of epidural abscess. It has been reported that PPT is treatable with endoscopic sinus surgery.[2,10,12] However problems still occur with ESS. Circumferential scarring and adhesions can limit the ability of sinus ostial openings to remain patent. In our two cases (case 2 and case 3), PPT possibly developed as a result of obstruction of the frontal ostia by scar tissues due to previous ESS's.

Pott's Puffy tumor is actually a frontal sinus abscess and usually develops secondary to obstruction of the sinus outflow tract. This obstruction may also be due to scars secondary to ESS.[13] Unless this abscess is drained, it can cause destruction in adjacent tissues. So the main purpose of the treatment is to provide drainage of the abscess. This drainage can be achieved with dilatation of the natural sinus ostium. Balloon catheter dilation of sinus ostia is a new technique especially useful in frontal sinus surgery.[7,14] The balloon catheter dilatation may be considered a minimally invasive surgery achieving the aims of ESS.[15] Balloon dilatation of the frontal sinus ostium is an effective method in the treatment of frontal ostium obstruction secondary to ESS.[7] Recently Hopkins et al.[8] reported that acute frontal sinusitis can be treated with balloon catheter dilatation. They also claimed that balloon dilation of the frontal recess could achieve long-term patency of the outflow tract by minimizing mucosal trauma and allowing effective clearance of purulent secretions and postoperative irrigation. On the other hand there have been reports of successful antibiotic treatment in patients who are in clinically stable condition and showing no neurologic deficit.[4] According to the above information, we performed balloon catheter dilatation with long-term antibiotics for treatment of PPT cases because the general status of the patients was stable without any neurological deficit.

In conclusion balloon catheter dilatation with long-term antibiotics can be an effective alternative treatment in selected PPT cases.

Declaration of conflicting interests

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