

Management of a Sacral Osteomyelitis and Literature Review

Sakral Osteomyelit Olgusunun Tedavisi ve Literatür Derlemesi

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ABSTRACT This a unique case report of an otherwise healthy 54 year-old man who was sustained a battle-field injury from high-velocity gun-shots leading to right knee disarticulation and sacral fracture and subsequent sacral osteomyelitis, which are extremely rare. Sacral osteomyelitis and sacral fracture without neurologic injury has not been reported, and, to our knowledge, this is only the first case of sacral osteomyelitis without neurologic compromise due to a foreign body and its management in the English literature. Of 23 reported cases of sacral osteomyelitis (secondary to non biological materials that was used in the index procedure or unknown etiology), there is not one reported case of sacral osteomyelitis secondary to a missile fragment. Our case was described in detail, including the method of osteomyelitis management, and a review of the literature regarding the etiology of the condition also is presented.

Key Words: Wounds and injuries; wounds, penetrating; fractures, bone; foreign bodies; foreign-body reaction

ÖZET Bu olgu sunumu, savaş alanında yüksek hızlı tüfek yaralanması neticesinde diz dezartikülasyonu ile sakral kırık ve sakral osteomyelite neden olan yaralanmaya maruz kalan sağlıklı, 54 yaşında erkek hasta ile ilgili özgün bir çalışmadır. Nörolojik yaralanma olmaksızın sakral osteomyelit ve kırık daha önce bildirilmemiştir ve bu olgu İngiliz literatüründeki ilk nörolojik yaralanma olmaksızın rapor edilmiş sakral yabancı cisim nedeniyle oluşan sakral osteomyelit ve tedavisidir. Daha önce bildirilmiş 23 sakral osteomyelit (ilk operasyon sırasında kullanılan biyolojik olmayan materyallere ait ya da başka bir sebeple) olgusu arasında kurşun çekirdeğine bağlı bir sakral osteomyelit olgusu daha önce yayınlanmamıştır. Olgumuz, osteomyelit tedavisi ve benzer etiyolojiye sahip durumlar irdelenecek şekilde ayrıntılı anlatılmıştır.

Anahtar Kelimeler: Yaralar ve yaralanmalar; yaralar, delici; kırıklar, kemik; yabancı cisimler; yabancı cisim reaksiyonu

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Although sacral osteomyelitis mostly presents as a chronic entity when bone is exposed in a long-standing decubitus ulcer, there are some case reports exist in the literature which designates postoperative complications leading to chronic sacral osteomyelitis. Acute or subacute sacral osteomyelitis is extremely rare.

A 2012 English-language search of the medical literature discovered 23 case reports of chronic sacral osteomyelitis other than secondary to decubitus ulcers. These reported cases included 7 cases seen after postoperative

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sacral colpoxy, one case together with emphysematous osteomyelitis, 3 cases in conjunction with inflammatory bowel diseases, one case with x-linked chronic granulomatous disease, one case with immunocompetent patient, one case after abdominal hysterectomy, four cases after ilial pouch-anal anastomosis, one case after caudal anesthesia and one case after foreign body ingestion.¹⁻¹⁷ The etiology at other 4 cases were unknown (Table 1).¹⁸⁻²¹

As with the other types of osteomyelitis, the preferred treatment of bone infection is antibiotic therapy. However, in the patient with intractable pain, evinced abscess formation, in case of foreign body or neurologic compromise surgical management may be indicated. Isolated case reports of sacral osteomyelitis treated with either antibiotherapy or surgical debridement or combination of both showed good outcomes and complete recovery.

We present the case of a patient who had 6 months of history of battle-field multiple gun-shot injuries to abdomen, left thigh and right leg in northern Iraq. He had underwent urgent right sided knee desarticulation at the field. Because there was a concern of sacral osteomyelitis, he was transferred from Iraq to our clinic. We detail our experience of successfully managing this case with surgical exploration, removal of the bullet and overcome the osteomyelitis by long term antibiotherapy. We also provide a comprehensive review of the literature pertaining to sacral osteomyelitis which was not done before in scope of an orthopaedic surgeon.

CASE REPORT

A 54 year-old man was presented with a history of approximately 6 months of previous battle-field multiple gun-shot injuries to abdomen, left thigh

TABLE 1: Summary of sacral osteomyelitis case reports.

Study (year)	Number of cases	Location	Etiology	Microorganism
Grimes CL (2012)	1	L5-S1	SCx	<i>C. albicans</i>
Collins SA (2011)	1	Sacrum	SCx	<i>Enterococcus</i>
Nosseir SB (2010)	1	Sacrum	SCx	<i>Staph aureus</i>
Muffly TM (2010)	1	Sacrum	SCx	<i>Staph aureus</i>
Taylor GB (2006)	1	Sacrum	SCx	<i>Staph aureus</i>
Hart SR (2004)	1	Sacrum	SCx	Negative
Weidner AC (1997)	1	Sacrum	SCx	<i>P. aeruginosa</i>
Propst K (2013)	1	Sacrum	SCx	P-B-S
Beloosesky Y (2002)	1	L5-S1	SCx	<i>S epidermidis</i>
Luey C (2012)	1	Pelvis&Sacrum	EOM	<i>F. Necrophorum</i>
Tonolini M (2011)	1	Sacrum	IBD	Unknown
Armstrong N (1998)	1	Sacrum	IBD	<i>C. albicans</i>
Davis CM (2007)	1	Sacrum	CGD	Unknown
Guiral J (1991)	1	Sacrum	IDD	<i>Nocardia asteroides</i>
Akhaddar A (2009)	1	S2-S4	PH	Unknown
Taylor WE (2006)	4	Sacrum	IP-AA	<i>S. viridans/E. coli</i>
Wittum S (2003)	1	Sacrum	CA	Unknown
Lin M (2012)	1	Sacrum	FBI	Unknown
Mahiquez M (2008)	1	L2-S1	Unknown	<i>Blastomyces dermatitidis</i>
Reddix RN Jr (2007)	1	Sacrum	Unknown	<i>Salmonella</i>
Barone SR (1997)	1	Sacrum	Unknown	<i>Staph aureus</i>
Liu Z (1995)	1	Sacrum	Unknown	<i>Aspergillus versicolor</i>

SCx: Sacral colpoxy; EOM: Emphysematous Osteomyelitis; IBD: Inflammatory Bowel Disease; CGD: Chronic Granulomatous Disease; IDD: Immune Deficiency Disease; PH: Post-Hysterectomy; IP-AA: Ilial Pouch-Anal Anastomosis; CA: Caudal Anesthesia; FBI: Foreign Body Ingestion; P-B-S: *Prevotella*, *Bacteroides*, *Streptococcus viridans*.

and right leg from Iraq. He had underwent urgent right sided knee desarticulation. Because there was a concern of sacral osteomyelitis he was transferred from Iraq to our clinic. The white blood cell count was 11700 cells/mL. The C-reactive protein level and erythrocyte sedimentation rate were 26 mg/dL and 106 mm/hr, respectively. Radiographs of pelvis demonstrated a foreign body at anterior part of sacral promontorium and missile fragments in the pelvis (Figure 1). There was a fistula hole located at postero-lateral aspect of the left leg (approximately 10 cm distal to tip of trochanter major). He explained a purulent chronic drainage from fistula hole starting after 6 weeks of injury. Also he state that drainage course was not changed after prolonged proper antibiotic usage.

Following transfer, pelvis CT and fistulography were performed to evaluate for fistula formation, the exact place of the foreign body and to assess osteomyelitis (Figure 2, 3). While admittance, he had a fistula formation which weighs an entry point of a lead at left posterior thigh. His neurologic assessment revealed full limb power and intact anal tone. Urogenital functions including urination and sexual intercourse were normal. Administration of enoxaparin was initiated to prevent deep venous thrombosis. For his pelvic pain, intravenous analgesics were used.

Surgical intervention was decided for stubborn fistula formation and sacral osteomyelitis due to foreign body. Under general anaesthesia, after bowel clean-up preparation, transperitoneal approach with periumbilical longitudinal incision was



FIGURE 1: Radiograph of the pelvis shows a lead and missile fragments which suggests a large-caliber rifle.

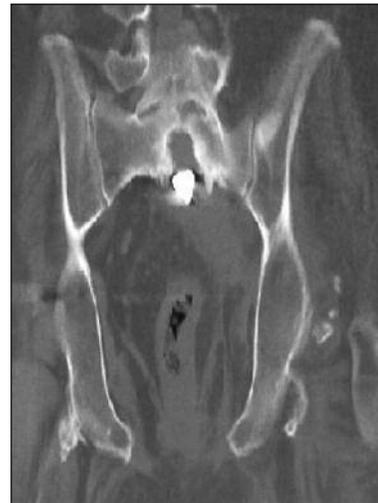


FIGURE 2: 3-D computerized tomography of the pelvis demonstrates a depression fracture of S1 corpus.



FIGURE 3: Lateral X-ray of the fistulography shows a fistula formation which originates from anterior of lumbosacral spine and ends at posterior thigh.

performed. After exploring the parietal peritoneum, the intestines were properly retracted to visualize visceral peritoneum. Visceral peritoneum then after was opened, in this way posterior pelvis and sacrum was explored. Superior and middle anterior surface of the sacrum was in leaden colour due to metallosis. A 4x4 cm cavity filled with infected granulation tissue between sacral 1 and sacral 3 segments was seen. Metal foreign body was so mobile in its cavity. Although foreign body was big enough for extirpation without help of fluoroscopy, we used fluoroscopy for expiration of foreign body and for bony curettage. All debris and granulation tissue was cleaned-up. They were sent to culture and histopathologic examination. Curre-

tage was continued and extended to see healthy bone of the sacral bone. Pelvis and cavity were irrigated with 3000 cc of serum saline. Two hemovac drain were placed on the anterior of the sacrum. Wound was closed in layers in routine fashion. Drains were removed after 72 hours of surgery.

The histopathological examination together with bacterioscopic study of the debris and leakage culture evaluation identified *Pseudomonas aeruginosa* that was sensitive for Meropenem. The patient had used 3 times daily intravenous 1.000 mg Meropenem for 3 weeks. By then, the laboratory indices had improved substantially and the leakage from the fistula was spontaneously stopped. He was discharged to his country on postoperative day 24 with use of oral ciprofloxacin 1000 mg per day for 4 weeks. At the time of discharge, he had a painless pelvis and a closed sinus of old fistula. There were no urogenital dysfunction. The sixth month follow-up examination showed normal laboratory findings with no pain or new fistula formation.

DISCUSSION

Long-standing decubitus ulcers leading to skin dehiscence is the major cause of chronic sacral osteomyelitis in the elderly population. However, chronic sacral osteomyelitis secondary to penetrating trauma or postoperative foreign body reaction is extremely rare with only 20 reported cases in the English literature and, although the posterior aspect of the sacrum is the most commonly involved part of the sacrum, osteomyelitis of the anterior body of sacrum have not been frequently reported. Of the 23 reported osteomyelitis, 9 were related to foreign body reaction which were used in the index procedure.

This is the first report of a sacral osteomyelitis secondary to penetrating trauma and management of this condition. In addition to this, we specifically reviewed the literature for all chronic sacral osteomyelitis secondary to foreign body and other anterior pelvic causes. To our knowledge, of the 23 reported sacral osteomyelitis, a missile was not once cited as a source of sacral osteomyelitis. Remarkably, the collective cure rate of these reported 23 cases were 100%.

Appreciation of the rare but possible occurrence of osteomyelitis due to foreign body is important for all surgeons who would attempt surgery on perisacral region or encounter foreign body near to sacrum. In addition to counseling the patient about long term treatment course of the condition and its chronicity, the surgeon should make an effort to discover any preexisting patient risk factors for osteomyelitis and intervene as necessary.

The most unpleasing consequences of a sacral osteomyelitis secondary to fracture or a foreign body reaction are intractable pain, abscess, fistula or neurologic impairment. Co-existence of neurologic deficit indicates surgical intervention.²² Gribnau recommends surgical fixation of sacral fracture to allow patient early weight-bearing, to enable neurologic recovery and to improve long-term quality of life.²³ Although Zelle, Gibbons, Lindahl and Ayoub at their studies showed admissible results after surgical decompression and internal fixation of sacral fractures with neurologic deficits, there still controversy exists about the effect of surgery on recovery of neurologic involvement.^{9,24-26}

We present this case report of a 54-year-old man sustaining from gun-shot injury with sacral osteomyelitis and foreign body to highlight the fact that neurological involvement after sacral fractures due to high velocity gun injuries is not imperative. We also want to emphasize the complication of a foreign body as osteomyelitis, fistula formation and any visceral organ injury despite abdominal trauma. In a previous report by Ghiu et al., an epidural abscess was described in a multiply injured active intravenous heroin abuser with closed sacral fracture.²⁷ They performed decompression of the sacral roots and drainage of the frank pus from the epidural space. They stated that intravenous drug abuse and sacral fracture are two predisposing factors for spinal infection.

A retained bullet does have some morbidities while being in the body. As previously stated by McQuirter et al, especially fragmented bullets with fractured bone near synovial tissue can result in time dependent lead toxicosis.²⁸ Additionally, chance of a delayed infection can rise especially

after a penetrating spine trauma and a retained foreign body.²⁹ Currently, the preferred method for the treatment of a foreign body is removal and decompression with or without spinal instrumentation.³⁰ Existence of infection plays an important role in planning the surgical approach.

This case report, with regard to orthopaedic surgery, illustrates achieving successful cure and excellent function after surgical irrigation and debridement with continuation of long term proper culture sensitive antibiotic medication of a sacral osteomyelitis, is possible.

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