University Journal of Surgery and Surgical Specialties

ISSN 2455-2860 Volume 2 Issue 6 2016

Bilateral Gluteus Maximus advancement flap for reconstruction of sacrectomy defect- A Case report and Review of Literature

MUKESH KUMAR SHARMA RAMAWTARSHARMA
Department of Plastic Reconstructive Surgery,
CHRISTIAN MEDICAL COLLEGE

Abstract :
Objective -Complex tissue defects following excision of sacral tumor often present a clinical challenge to the reconstructive surgeon. In this article, we present the bilateral gluteus maximus advancement muscle flap for immediate reconstruction of the extensive sacral defect after resection of large sacral chordomas.Materials and Methods We describe a case of a 54 -year-old man who presented with a longstanding history of sacral chordoma. He underwent mid sacral amputation creating a large sacral defect of size 15cm x 20 cm. Bilateral gluteus maximus advancement based on the superior gluteal artery was done.Results No complication was observed during the postoperative period. The patient was healthy and no recurrence was observed during the 03 month follow-up period.Conclusion The bilateral gluteus maximus advancement flap based on superior gluteal artery provides a reliable solution for the surgical reconstruction of large sacral defect following sacral chordoma excision.

Keyword : Gluteus flap,Gluteus maximus flaps,

Introduction:
Complex tissue defects following excision of sacral tumor often present a clinical challenge to the reconstructive surgeon. Ablative surgery of sacral chordoma can result in deep defects and disruption of the posterior pelvic wall. Failure to achieve proper surgical closure of such defects may lead to infection, wound dehiscence, and consequently delay in adjuvant therapy. These tumors are relatively unusual, guidelines for their management may not be readily available.[(1)]
In the current article, we present the gluteus maximus advancement flap for reconstruction of the extensive sacral defect after resection of sacral chordoma. **Case report:** Fifty four year old man presented with history of low back ache associated with a slow growing swelling over the sacral region for two years. He also had incomplete sense of voiding, constipation and erectile dysfunction for 6

months and tingling paraesthesia along the L4 dermatome for 15 days. His higher mental function and cranial nerve examination were normal. There was ill defined, firm, non tender swelling of around 8 x 8 cm size at the sacral region more towards the left. The X-ray lumbosacral spine showed destruction of the sacral bone below S3 vertebrae. Non contrast CT showed a large 13 x 11 x 11 cm well defined, expansile lytic lesion with few lobulation arising from the S3 sacral vertebral body. (Fig.1) CT guided biopsy was reported as a sacral chordoma.

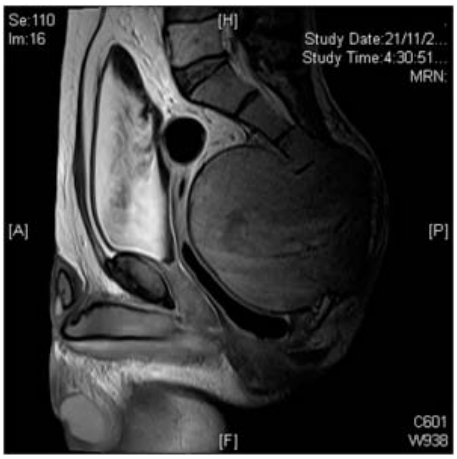

Figure1-Non contrast CT showing sacral chordoma

He underwent a preoperative embolization of median sacral artery. In prone position through a posterior approach midline incision was made gluteus maximus muscles were retracted laterally. After ligating inferior gluteal vessels, part of gluteal muscles was excised with the tumor. Mid sacral amputation with en-bloc total tumor excision was performed.(Fig.2) This resulted in a significant, large dead space of around 15cm x 20 cm size at the posterior peritoneum.(Fig.3) There was no skin defect. The sciatic nerves on both sides were intact. A transverse skin incision was made at the level of posterior superior iliac spine on left side to mobilize the gluteal muscle. Both side gluteus maximus muscle was dissected from upper and lateral insertions and muscle flap was elevated based on the superior gluteal vascular system (Fig.4) and advanced medially into the retroperitoneal dead space. Both gluteal muscles were mobilized medially and sutured to each other to reconstruct the sacral region. (Fig.5&6) Closed-suction drains were placed, the gluteal skin flap was sutured at the original position, (Fig.7) and a compressible dressing was applied. Post-operatively patient was nursed in lateral decubits position alternately and an air-floating bed was used. The postoperative course was uneventful and there were no complications. (Fig.8)

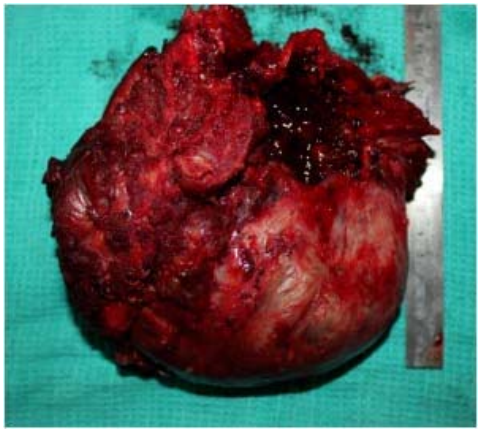

Figure 2: Excised Chordoma

Figure 3: Soft tissue defect following Sacral Chordoma excision Figure 4: Raised gluteus maximus muscle flaps Figure 5: Flaps advanced towards midline Figure 6- Flap advanced and sutured to opposite gluteus muscle Figure 7: Skin closure

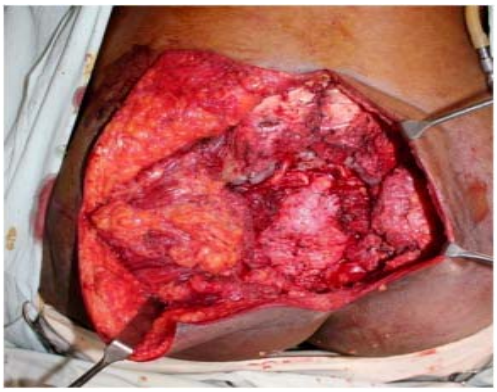

Figure 8: One Month post-op follow up

DISCUSSION:

Chordoma is derived from the primitive notochord and is located along the axial skeleton. It is a low-grade and slow-growing, locally aggressive malignant tumor and often discovered at a late stage because of its preferential location in the sacrum.[2][3] The recommended treatment of that these tumors is radical surgical excision.[4] High sacral amputation for extirpation of chordoma is the preferred method.[5] Resection of chordoma usually results in extremely large pelvic defect. Simple midline closures may not be possible and results in postoperative wound dehiscence and infection.So repair with well vascularized soft tissue is required.[5] Furukawa et al recently reported

the use of the Gluteus Maximus adipomuscular turnover and sliding flaps for sacral chordoma defects. Theadvantages of using the Gluteus Maximus muscle are its bulk, proximity to the defect, and robust blood supply.(4)(6) (7)(8)

The Gluteus Maximus originates from the lateral sacrum and posterior superior iliac crest and insertsinto the greater trochanter of the femur and iliotibial tract. It is shaped like a parallelogram. This is atype III muscle with two dominant pedicles (superior and inferior gluteal arteries). The superior andinferior gluteal vessels enter about 5 cm from the pelvic origin of the muscle, and the medialcircumflex and the first perforating femoral artery enter the muscle close to the femoral attachment.There are extensive anastomoses between the gluteal system and the lumbar perforators. [6] Lateralposition and deep location of the gluteal pedicles, robust collateral circulation, allows safe elevation ofGluteus Maximus flap. Based on superior gluteal arteries it can reach the ipsilateral ischium and sacrum.

In our case report muscles are detached from the superior attachments and advanced towardsmidline keeping the blood vessels intact. The suturing of each muscle to its contra-lateral counterpartcreates a strong posterior peritoneal repair that employs the blood supply of both the superior pedicles. The use of gluteus maximus flaps has many advantages over other reconstruction andclosure approaches which include robust blood supply, large muscle, anatomic location proximal tothe sacrum, no need for additional intraoperative incisions or repositioning of the patient. When asacrectomy is performed from posterior approach retention of a native and robust blood supply maybe central to the long-term durability and viability of flaps. The separation and movement of flaps is much easier than other kinds of gluteus maximus muscle flap approaches, such as the use of antegrade or retrograde gluteus maximus rotation flaps described by Koh et al.[9]This method,however, yields less flap volume and less moving distance than the other Gluteus Maximus flapapproaches reported previously,[9] and is only suitable for defects less than 30 cm in diameter. [10]Diaz et al suggested that that gluteus muscle flaps may be inadequate to obliterate the large deadspace in the elderly patient with an attenuated gluteus muscle with insufficient bulk .[11]

Although some studies have reported no functional deficits in ambulatory patients with gluteal flaps,the potential for compromise of ambulatory function has been a concern when using these flaps.[12][13][14] Ramirez et al. assessed postoperative muscle function, analyzed gait, and performedelectromyelographic studies in patients who had undergone treatment involving various types ofgluteus maximus local flaps. The deficits noted were evident during forceful activities, such asrunning, jogging, and climbing stairs, but not during light activities, such as standing or easy walking. (6)(8)(15)

Conclusion:

We conclude that a gluteus maximus advancement muscle flap as a modification of the conventionalgluteus maximus muscle flap is a good option to obliterate an extensive dead space following sacral

amputation for sacral chordoma. The flap eventually enabled the successful reconstruction of sacraldefect with well maintained contour and flap volume.In summary, our approach demonstrates the usefulness of the bilateral gluteus maximus muscles flaps for reconstruction of sacrectomy defects.

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