

# Chordoma of the sacrum: “en bloc” total sacrectomy and lumbopelvic reconstruction

© Springer-Verlag 2010

Peter Paul Varga MD and Aron Lazary MD, PhD

## Keywords

Chordoma · Sacrum · En bloc total sacrectomy · “Closed loop” lumbopelvic stabilisation

## Introduction

Chordoma is a rare primary bone tumor accounting for 1–4% of all primary malignant bone lesions mainly localized in the clivus and the sacrococcygeal region. Originating from the remains of the embryonal notochord, it is a relatively slow-growing, low-grade malignancy. The sacral manifestations represent approximately 50–60% of the cases and typically appear around the fifth decade. Due to the relatively tolerable symptoms, sacral chordomas are usually diagnosed in advanced stages when surgical treatment is technically challenging. As a treatment option, there is currently no long-term experience with widely accepted chemo- or radiotherapeutic modalities. According to general clinical experience resection surgery is recommended, optimally the “en bloc” resection of the tumor can decrease the risk for local recurrences and the possibility of metastatic process in a latter stage of the disease [1]. Here, we describe the “en bloc” resection of a sacral chordoma performing a total sacrectomy with soft tissue and bony reconstruction and lumbopelvic stabilization by a “closed loop” technique.

## Case description

The 42-year-old male patient had had mild and obscure low back pain for 4–5 years. He had experienced some minor problems with urination and defecation for 1 year and a palpable lump had been observed for some months in the sacral region. Neurological examination showed normal motor and sphincter function but a mild hypaesthesia in the perianal region. Radiological examinations revealed an extended tumor mass affecting the whole sacrum with significant soft tissue extension to the retroperitoneum and cranially involving the paravertebral muscles as far as the L-III spinal level on the right side. Histological diagnosis of chordoma was made after an open biopsy procedure. Total “en bloc” sacrectomy combined with soft tissue and bony reconstruction together with lumbopelvic stabilization (“closed loop” technique) was planned to remove the tumor.

## Surgical procedure

The patient was positioned in prone position on the Cloward surgical saddle. Extended curved skin incision was made starting from the middle thoracic level on the left side going caudally reaching the right iliac crest and terminating at the level of great trochanter of the left femur. The dorsolumbar fascia was divided and cut according to the preoperatively planned wide oncological margin, then bilaterally the gluteal fascia and the gluteal muscles were divided from the iliac crest. According to the lateral margin of the tumor, the muscle fibers of the gluteal muscles were dissected together with the perisacral ligamentous complex, including the coccygotuberal ligaments. Bilaterally, the piriformis muscles were carefully divided and detached laterally from the femoral bone. The posterior iliac crest

**Electronic supplementary material** The online version of this article (doi:10.1007/s00586-010-1460-4) contains supplementary material, which is available to authorized users.

was then cut by oscillating saw at the level of the SI joint, and the medial cortical surface of the iliac bone left on the specimen. The paravertebral muscle complex was detached as a whole from the lower lumbar neural arches, and the fourth and fifth laminae were removed.

After this the lumbosacral intervertebral disc was resected, and the dural sac (together with the cauda equina) was cut through immediately below the L5 origins. Bilaterally the cranial and ventral ligaments of the SI joints were cut and the nerve roots (bilaterally below the S1) were also cut at the lateral aspect of the tumor. Elevating the specimen, the rectum was bluntly dissected and separated from the ventral aspect of the tumor. Then the tumor was removed.

After dural closure, transpedicular screws (Legacy TM) were inserted into the LII–V vertebral body and bilaterally 7.0 × 75 mm screws were positioned into the iliac bones. A single rod was shaped in a “U” form according to the patient’s local dimensions (“closed loop”) and attached to the screws. Artificial bone substitute (ACTIFUSE, TM) was positioned between the LV body and the iliac crest bilaterally after refreshing and preparing well bleeding spongy bony host surfaces. The large defect of the body wall between the LV vertebral body and the coccygeal ligamentous complex was covered by Dacron mesh (anchored to the bony landmarks: LV vertebral body, tuber ossis ischii and iliac bone). Finally, the wound closure was performed by creating bilaterally m. gluteus maximus rotatory flaps. Before the closure, Jackson–Pratt drains were positioned bilaterally between the mesh and the muscle layers.

As a last step, the surgical specimen was cut and we checked the oncological margins; no tumor violation was observed.

### Postoperative procedure

The mobilization of the patient began on the first postoperative day in lying position: lower leg massage and active exercises were introduced. We removed the suction drains after 3–4 days, and let the patient stand up on the fifth postoperative day. There were special considerations regarding the bowel and bladder function. In some cases patients require psychological support by experts during the first months of the postoperative rehabilitation.

The result of the histopathology was chordoma, the surgical margins were negative.

### Discussion and conclusion

“En bloc” total sacrectomy with wide oncological margins is recommended if the chordoma involves all of the sacral levels [2]. If there is no bony connection between the remains and the iliac crests after the resection, we prefer lumbopelvic stabilization, in this case the “closed loop” (single rod) technique, which we developed during the last decade.

Due to the fact, that the proper resection involves the sacral nerves, the surgeon should prepare the patient before the surgery for the expected postsurgical neurological deficits regarding the control of the sphincters and some lower extremity muscle activities. Special considerations should be addressed to the postoperative psychological support, particularly in patients younger than 50 years [3].

After total sacrectomy the complication rate of the wound healing is quite high (32% in our institution). Necrotization of the muscle or skin flaps, deep wound infection could result in a need for second or third surgery for the debridement and sometimes the surgical wound heals on a secondary manner during weeks of local treatment. Such patients could be mobilized slowly and carefully. The recovery time highly depends on the level of neurological deficit and the patient cooperation [4]. These patients require a prolonged period of locomotor and neurorehabilitation. The follow-up should last for as long as possible, in our experience the routine duration is 5 years.

### References

1. Fourney DR, Rhines LD, Hentschel SJ et al (2005) En bloc resection of primary sacral tumors: classification of surgical approaches and outcome. *J Neurosurg Spine* 3(2):111–122
2. Varga PP, Bors I, Lazary A (2009) Sacral tumors and management. *Orthop Clin North Am* 40(1):105–123 (vii. Review)
3. Boriani S, Saravanja D, Yamada Y, Varga PP, Biagini R, Fisher CG (2009) Challenges of local recurrence and cure in low grade malignant tumors of the spine. *Spine (Phila Pa 1976)* 34(22Suppl):S48–S57
4. Hsieh PC, Xu R, Sciubba DM, McGirt MJ, Nelson C, Witham TF, Wolinsky JP, Gokaslan ZL (2009) Long-term clinical outcomes following en bloc resections for sacral chordomas and chondrosarcomas: a series of twenty consecutive patients. *Spine (Phila Pa 1976)* 34(20):2233–2239