Mini open tumor resection and percutaneous instrumentation for T11 renal cell carcinoma metastasis

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Learning targets

- To identify a new strategy, limiting the access for extensive tumor resection in the palliative treatment of vertebral metastasis.
- To learn the steps of percutaneous instrumentation and spinal cord decompression.
- To learn a simplified method of anterior column filling of an osteolytic vertebra.
- To show possibilities of intraoperative hemorrhage control in renal cell carcinoma metastasis.

Introduction

Neural decompression and stabilization belong to the standards of oncologic management of metastatic vertebral lesions, which are at risk of spinal cord compression.

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Quality of life, tumor associated pain, pathologic fractures and the neurologic status may be improved by surgical treatment [1]. The revised Tokunashi score [2] represents a common tool, which enables predicting prognosis on a multidisciplinary basis and to decide if conservative treatment or palliative surgery would be adequate, depending on the patient's pathology and comorbidities. Minimally invasive surgery may enlarge the possibilities of palliative procedures. Cementoplasty has a stabilizing effect at the level of the vertebral body and reduces pain efficiently [3]. This technique can be combined with decompression of the lumbar spine, if facet joints and pedicles remain intact. Minimally invasive transpedicular tumor resection through a tubular retractor, combined with percutaneous instrumentation, has been recently described for unstable compressive lesions [4]. Additionally, metastases of well-vascularized primary tumors, such as renal cell carcinoma, present an intraoperative risk of hemorrhage and require a preoperative transarterial embolization [5, 6]. A limited open approach, focused on the tumor area, may further reduce intraoperative bleeding and operating time, which represents a theoretical advantage with regard to the patient's morbidity.

Case description

A 64-year-old male presented with back pain at the thoracolumbar junction, which worsened over the last 3 months. The patient underwent a left sided nephrectomy

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for renal cell carcinoma 20 years ago. A local recurrence required a partial pancreas and adrenal gland resection 5 years later. The neurological status evidenced a bilateral hyperreflexia of the patellar reflex. The Babinski sign was negative and there was no weakness or dysesthesia of the lower limbs. Thoracolumbar spine radiographs evidenced a disappearance of the left T11 pedicle eye on the antero–posterior view. The total body scan demonstrated an osteolysis of the lamina, the facet joints, the pedicle and the transverse process of T11 on the left side. There was also an extension to the rib and the pleura as well as another metastasis at the left psoas muscle. Magnetic resonance imaging showed the tumor mass and spinal cord compression at T11 on T2-weighted images. The hypersignal around the well-vascularized tumor was evidenced after injection of Gadolinium contrast media, which made preoperative embolization mandatory.

Surgical procedure

The patient was placed in prone position on a Jackson table, which avoids abdominal compression and limits venous bleeding during the surgery. The pedicles of T7, T9, T12, and L1 were marked fluoroscopically in order to perform percutaneous pedicle screw placements with cannulated pedicle screws through small skin incisions. A rod was placed percutaneously and all implants, locked on the right side, stabilized the spine. A left sided paravertebral incision of approximately 7 cm was made at T10–T11. This approach reduces extensive paravertebral muscle dissection by combining the benefit of a percutaneous instrumentation above and below the tumor area, thus limiting dissection to the main focus of spinal cord decompression. A laminectomy of T10–T11 was performed. The vertebral body was completely relieved of its tumor mass and the anterior part of the spinal cord was also decompressed. An extrapleural resection of the thoracic tumor mass was performed through the same incision. The total blood loss was estimated at 400 ml and combining different techniques reduced the bleeding volume. Preoperative embolization using microspheres (500–700 μ m) was performed within 48 h prior to surgery to avoid the revascularization of the tumor. Intraoperatively, an absorbable hemostatic gelatin flowable matrix with thrombin was applied to the tumor bed immediately after resection. Furthermore, the vertebral body defect of T11 was filled, using polymethyl-metacrylate cement mixed with pieces of hemostatic gauze. This technique allowed stopping bleeding completely and avoided a cement leakage around the decompressed spinal cord. The dura was continuously irrigated during cement polymerization to avoid thermic damage to the cord. A gelatin foam sponge

was finally applied over the dura. The second rod was then placed on the left side and wound closure was performed.

Postoperative information

Neither intraoperative nor postoperative blood transfusions were necessary. The patient did not need to stay in intensive care postoperatively and the total hospital stay in a conventional general spine surgery ward was 5 days. Ambulation without a brace was started the first day after surgery. Physiotherapy was started at 6 weeks, once wound healing was completed. Pain was significantly reduced and the neurological status remained normal during follow-up. A multidisciplinary team of the oncology department continues to care for the patient, who is currently undergoing adjuvant therapy using an antiangiogenic agent (Everolimus).

Discussion and conclusion

During the last few years, the use of minimally invasive surgery (MIS) has increased and has widened therapeutic options for the palliative treatment of patients with compressive spinal metastases. Percutaneous instrumentation techniques avoid extensive posterior dissection, thus reducing the main surgery of tumor resection and spinal cord decompression. This strategy could modify indications based on the Tokuhashi score [2] by shifting a certain number of indications from conservative treatment to less invasive palliative interventions. The principle of combining a minimal access technology and percutaneous instrumentation seems interesting [4]. However, an efficient intraoperative bleeding control by embolization seems mandatory in renal cell carcinoma metastases [5, 6]. The application of several hemostatic agents appears helpful, and an augmentation of the vertebral body defect can be performed using the same procedure.

Conflict of interest None.

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