

# **SURGERY OF EXTRADURAL METASTASES OF THE SPINE**

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## **Abstract**

*In last decade surgical treatment of spinal metastases improved significantly, mainly because of improvement in diagnostics and surgical technique. Concerning surgical technique anterior approach with corpectomy and stabilization is used whenever type, location and life expectancy do not dictate it as inappropriate.*

*The aim of our study was to review our experience with segmental resection for spinal metastases.*

*From February 2003 till February 2007 39 patients were operated for extradural spinal metastases. The primary tumour was located in breast in 16 cases and in lung in 8 cases. There were 8 metastases from kidney and 5 from prostate. Once a disease originated from intestinal and laryngeal carcinoma. Surgery was indicated because of neurological symptoms in 11 cases and because of pain*

*in 17 cases. Other 11 patients were operated because of frank or incipient spinal instability.*

*Segmental or partial segmental resection was performed in 19 cases and tumour debulking in 20 cases. Three weeks after surgery pain regressed on the bases of visual analogue scale from 7.5 (4-10), to 3.5 (1-7). Five out of eleven patients improved neurologically three weeks after surgery. In segmental resection patient pain dropped from 7.2 (4-8) preoperatively to 1.9 (1-5) postoperatively. 15 out of 19 patients with segmental resection were ambulatory three weeks after surgery. On the bases of our experience we conclude that segmental resection with stabilization should be performed in isolated breast or kidney metastases. In cases of lung metastases without neurological symptoms simple posterior decompression with stabilization provides acceptable morbidity with satisfactory result.*

## **INTRODUCTION**

Metastases are the most common form of skeletal tumours, met by orthopaedic surgeons. Spine is the most common place for bone metastases; therefore treatment of spine metastases represents an important part of all skeletal pathology. In the last two decades there has been a significant change of attitude towards treatment of spinal metastases both around the world and in our country. There has been a large qualitative break through in the diagnostics and even more in surgical treatment of metastases. Anterior approach to all the regions of the spine, once practised only by a few orthopaedic surgeons in biggest spine centres, is becoming everyday practice of modern (contemporary) spinal surgeon. Through team approach, which combines spinal surgeon with oncologist, radiologist and neurologist, the quality of treatment has improved significantly for patients with spinal metastases.

## **METHODS AND SUBJECTS**

In Dept. of Spinal Surgery, KC Ljubljana 39 patients with spinal metastases were operated between February 2003 and February 2007. There were 22 females and 17 males. The primary tumour was located in breast in 16 cases and in lung in 8 cases. There were 8 metastases from kidney and

5 from prostate. Once a disease originated from intestinal and laryngeal carcinoma. Average age of our patients was 63 years (44 to 81). The most frequent area of the surgery was lumbar spine (18 times), followed by thoracic (14 times) and cervical spine (7 times).

22 out of 39 patients either had chemo or radiotherapy prior to surgery. In 10 patients, in whom the location of the primary tumour was not known, we performed biopsy prior to surgery. Biopsy was always performed transpedicularly and was in all cases diagnostic.

As a diagnostic procedure we always performed classical X-ray of affected region of the spine, scintigrafic scan using Technitium and MRI. Clinical examination was performed prior to surgery and two to three weeks after the surgery. It included neurological examination by neurologist or neurophysiologist. Pain was asserted according to visual analogue scale (VAS) (7).

Indications for surgery were acute neurologic deficit in 4 cases, progression of neurologic deficit (symptoms) in 7 cases, severe pain, non responsive to conservative treatment in 17 cases, other patients were operated because of frank or incipient spinal instability. In 8 cases only involvement of lower motorical neuron was noted, in 6 cases there was combined involvement of both lower and upper motorical

neuron. All the patients but seven were able to walk by themselves or with assistance of physiotherapists prior to op.

Right after the surgery and three weeks after the surgery classical X-ray of the operated region of the spine was taken.

## RESULTS

We managed to perform planned operation in 38 out of 39 cases. The only case we weren't able to finish the operation as planned was the case with kidney carcinoma metastases to fourth lumbar vertebra. We stopped the operation at the 6000 ml loss of blood, whilst we were unable to control the bleeding. In other cases the loss of blood was always less than 2500 ml, except in the case of metastases of hypernephroma when total blood loss was 11.000 ml of blood.

Segmental resection was performed in 7 cases, all of them being metastases of breast carcinoma. Partial segmental resection was performed 5 times with metastases of kidney 6 times breast carcinoma and once with metastases of laryngeal carcinoma. Other operations were palliative in nature with removal of tumour from nerve structures (debulking).

Spine was stabilized in all cases except with partial segmental resection of the kidney carcinoma metastasis to Th 10. That was one of 12 cases in which we performed only anterior approach. Combined anterior and posterior approach was performed 8 times, always during the same operation. In other cases we operated through posterior approach only.

As obtained by VAS, the preoperative pain averaged 7.5 (4-10) and three weeks after the surgery 3.5 (1-7). Neurologic deficit was completely gone only in the case of metastasis to C4, where we preoperatively observed one sided deltoid muscle paralysis which lasted for two weeks. In other patients neurologic status partially improved or stayed the same as before surgery. Patient with hypernephroma metastasis to Th 12 developed cauda equina syndrome with retention of urine after the surgery, which still lasted three months postoperatively.

Patients were mobilised as soon as possible. All but two of them were able to walk by themselves or with the help of physiotherapist from third postoperative day on. Patients that were not treated with radio or chemotherapy preoperatively were transferred to Oncological institute for adjuvant treatment.

All patients were postoperatively given orthoses for additional immobilization of the operated segments of the spine, except those with segmental or partial segmental resection and stabilization.

## DISCUSSION

Decision upon operative treatment of extradural spine metastases depends on many factors. The most important ones are location of the tumour, origin of primary carcinoma, radio- and chemosensitivity of the tumour, stability of the spine, pain, neurological deficit and general patient condition. Different kinds of specialists decide on those factors, therefore decision about treatments has to be made in a team. In the last two years we have established a nonformal team of oncologist, radiologist, neurologist and orthopaedic surgeon, which provides complex approach to treatment of spinal metastases.

When we decided to operate, operative plan had to be made. There are numerous reports in the literature about advantages of anterior approach decompression, mainly because it provides bigger improvement in the neurological status and stability of the spine. That is especially the case with thoracic spine where spinal canal is narrow and chances of additional neurological deficit whilst manipulating neurostructures bigger. It is not quite clear whether laminectomy combined with radiotherapy provides better results than radiotherapy alone (1, 3).

Therefore we tended to operate our patients with anterior approach with thoracotomy, thoracolumbotomy or lumbotomy, if bigger operation was appropriate according to life expectancy. In these cases we performed resection or segmental resection. We performed debulking (removal) of the tumour through posterior approach only when compression of neurological structures was only from the back. In our series it was only with metastases of prostate cancer to lumbar spine. Laminectomy with posterior decompression and stabilization was also performed when life expectancy was about six months. We decided not to operate if life expectancy was less than six weeks or if the patient with life expectancy of only several months was bedridden, with no hope of operative improvement (2).

During the operation we always performed stabilization of the spine beside decompression, only in the case of the patient with limited involvement of Th 10, where tumour removal did not destabilize the spine. Proper stabilization provides chances of optimal postoperative mobilization, which in patients with spine metastases means significant improvement in the quality of remaining life. Anterior spinal column was supported in all cases of segmental resection, once with partial segmental resection and in all cases of operations on cervical spine. Spondylodesis was performed on patients with life expectancy more than one year, in other patients we performed only stabilization with osteosynthetic material with or without bone cement.

Metastases of hypernephroma require specific treatment. Considering tumour is resistant to radio- and chemotherapy the only way to treat and significantly prolong life is through

surgery (9), especially when only one solitary metastasis is discovered. This kind of metastasis represents surgical challenge in its vascularity and consequential bleeding at removal. In the last three years we operated six cases of hypernephroma cancer. In the first case we were unable to extract the whole tumour at the level of L4 due to heavy bleeding, even though an embolization was performed a day prior to surgery. In the second case of hypernephroma metastases to Th 12 we planned posterior approach with reduction of tumour and stabilization, followed by anterior corpectomy and insertion of appropriate cage (10). During posterior operation blood loss amounted to 8000 ml, although we closed all proximal and distal epidural blood vessels prior to tumour removal. During anterior operation there was another 2000 ml of blood loss, although we closed all segmental blood vessels at three levels. In the third case of hypernephroma metastasis, it was confined to a part of Th 10 body and half of posterior elements. We decided on isolated anterior approach. We closed all segmental blood vessels at three levels and so managed to cut down blood loss to less than 1000 ml. Other three cases of hypernephroma metastases were anterior approach ligation of segmental vessels and with blood loss of less than 2500 ml. On the basis of our limited experiences we conclude that, in operating metastases of hypernephroma it is best to first approach anteriorly, close all segmental blood vessels at several levels and then proceed with posterior operation if necessary. An embolization prior to surgery, though important, does not guarantee significant reduction of blood loss.

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