Introduction

When traumatic spine fractures occur, we first think of osteoporotic or metastatic spine fractures. Reason for common localization of metastases in spine is the Baxter’s plexus. Baxter’s plexus connects drainage area of upper and lower cava vein, similar like azygos veins, from occiput to sacrum. It has no valves and intraabdominal pressure of toraco-abdominal space does not change pressure in it, since it is located mostly in vertebral bodies.

Stability of spine column can be reduced by a pathological process: osteoporosis, hemangioma, multiple myeloma, metastasis (prostate, kidney, breast, rectum, ventriculus). Pain is minimal at the beginning, and is increased after some event – sudden sitting down, falling in house, lifting of heavy object, etc.). Neurological symptoms appear latterly, when compression of medulla or nerve roots become extensive.

Standard X ray imaging can present marked litic lesion (hemangioma) or irregular lesion (myeloma or metastasis). X ray imaging is positive just after 60% of bone mass is destroyed, and it is not reliable to differentiate an acute from chronic lesion. CT scan allows better visualization of fracture geometry and relation of bone and medulla. It is also rather inconclusive regarding to fracture etiology (osteoporosis, benign or metastatic bone lesion). MRI presents real size of metastasis and its relation to the surrounding tissues (medulla, aorta, v. cava). Scintigraphy is very useful for detecting and numbering of all metastasis in the body.
Metastatic spine disease is not related to the TNM tumor staging, or, in other words, metastasis can appear in all stages of TNM, regardless the life expectancy life expectancy. However, life expectancy is factor which determines our treatment strategy.

For the patient whose general condition is bad and life expectancy is short, complex surgery is risky and unnecessary. In such circumstances, the aim of treatment is reduction of pain, prevention of spine collapse and neuro deficit. We also chose palliative procedures: vertebroplasty/posterior spondilodesis. Therefore, it is very important to analyze general condition of patient, level of pain, neurological status, tumor dissemination and its primary localization, and its pathohistology, and estimate his life expectancy and realize his expectations of our treatment. Quantification of all those factors is performed by Tomita score (Table 1.). Tomita score allows us to calculate patient’s life expectancy according his pathohistological diagnosis, general and neurological status, presence of spine and other metastases, with 85% of reliability.

According to the Revised Tomita Score – RTS we estimate life expectancy and consequently, a recommended treatment (Table 2.).

### Table 1. Tomita score

<table>
<thead>
<tr>
<th>Revised Tomita Score - RTS</th>
<th>0 points</th>
<th>1 point</th>
<th>2 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>general condition</td>
<td>weak</td>
<td>mid</td>
<td>good</td>
</tr>
<tr>
<td>neurologic cond.</td>
<td>weakness</td>
<td>paresis</td>
<td>normal</td>
</tr>
<tr>
<td>meta. in organs</td>
<td>untreatable</td>
<td>treatable</td>
<td>no</td>
</tr>
<tr>
<td>meta. in vertebrae</td>
<td>≥3</td>
<td>1-2</td>
<td>no</td>
</tr>
<tr>
<td>other bone meta.</td>
<td>≥3</td>
<td>1-2</td>
<td>no</td>
</tr>
<tr>
<td>Pathohistology:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lung, sarcoma, gaster, esophagus, pancreas</td>
<td>0 pts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>liver, cholecyst</td>
<td></td>
<td></td>
<td>1 point</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td>2 pts.</td>
</tr>
<tr>
<td>kidney, uterus</td>
<td></td>
<td></td>
<td>3 pts.</td>
</tr>
<tr>
<td>Rectum</td>
<td></td>
<td></td>
<td>4 pts.</td>
</tr>
<tr>
<td>breast, prostate, carcinoid, thyroid</td>
<td>5 pts.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 2. Revised Tomita Score with life expectancy and recommended therapy

<table>
<thead>
<tr>
<th>RTS points</th>
<th>Life expectancy (months)</th>
<th>Recommended therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-8</td>
<td>0-6</td>
<td>no therapy; radio and chemoth., ev. percut. biopsy, orthosis; palliative th. (vertebroplasty, posterior spondilodesis, ev. decompression)</td>
</tr>
<tr>
<td>9-11</td>
<td>7-12</td>
<td>above mentioned th. in more aggressive form</td>
</tr>
<tr>
<td>12-15</td>
<td>13 and more</td>
<td>tumor excision (vertebro- or corpectomy, depended of involvement of pedicle; posterior and anterior spondilodesis), ev. adjuvant or neoadjuvant radio/chemotherapy</td>
</tr>
</tbody>
</table>

In treatment of such hard medical conditions, the role of orthopedic surgeon is to provide tumor tissue for pathohistological analysis and operative treatment. Those two tasks can be accomplished as a outpatient in local anesthesia with C arm assistance (percutaneous biopsy of tumor with a concomitant vertebroplasty).

The aim of this work is to present our results of performing this procedure and to describe its importance.

### Patients and methods

Including factors were: X ray, CT or MR signs of pathologiical fracture of thoracic and lumbal vertebra of unknown origin. Twenty-five patients with mentioned criteria were directed to the Spinal department of Clinic for orthopedics and traumatology of Clinical centre University of Sarajevo from October 1st, 2008 to October 1st 2013. During this procedure patient is positioned in abdominal decubitus on the radiolucent surgical table. Operative field is prepared, one C arm is directed horizontally, second one vertically, so that, in each moment, an X ray technician can provide frontal and sagital X ray of targeted vertebra (Figure 2.).

Adherence to anatomical characteristics of each targeted vertebra is of the uppermost importance. Biopsy needle is penetrated into the vertebral body through working channels. Piece of tumor tissue is taken for the pathohistological analysis. This procedure is about 10 minutes, long and the only term of its performing is that patient can lay on his stomach during the procedure.
Results

Biopsy was performed on 25 patients using the needle biopsy under C arm in local anesthesia. Positive pathohistological proof of tumor was at 21 of them (84%). Other four patients had unrepresentative tissue piece, and we had to repeat the procedure. After pathohistological diagnosis and tumor staging, surgical procedure was necessary only at 8 patients (32%), (Picture 3.) Other 68% of patients had no active spine surgical treatment because metastatic disease with more aggressive histological types advanced (G2). They were only indicated with radio/chemotherapy (low Tomitta score and short life expectancy).

Discussion

Bone metastases are 25 times more common then primary bone tumors. In clinical practice, bone metastases are detected in one third of patients with malignancy, and even in two thirds on the obductions. For instance, 27% patients with carcinomas have bone metastases, and vertebral bodies are vertebral bodies are parts of the skeleton which are most frequently caught. About 8% of patients with all malignances have spinal metastasis, most common being thoracic spine, about 70%, lumbar spine 20%. Bearing this in mind, we have to be highly suspicious of oncology patients with back pain - it is considered to be spine metastasis unless proven different. Maximum suspicion should be given to the presence of others clinical signs of malignoma (weight loss, grey or icteric face habitus, inapetence, long-lasting pain, respiratory, urinary or gastric problems). Concerning the seriosity of tumor diseases and spine fracture it is very important to complete as sooner as possible its TNM-G staging.

So far, a hospitalization of patient with malignancy on the clinic of orthopedics-traumatology, with performance of long lasting staging, including spine biopsy has been common practice. Staging includes further diagnostic procedures: standard and specific laboratory, chest X ray, echo of abdomen, spine CT, and eventually, CT angiography and spine MRI. Sometimes, more than a couple of weeks is needed for this procedure and, during that time, patient’s condition becomes worse.

Minimally invasive procedures are the gold standard in all situations where they are feasible with high reliability. Therefore, for the last two decades, percutaneous spine biopsy in local anesthesia under C arm control which does not need classic preoperative patient’s preparation has been recommended. This kind of material acquiring for pathohistology allows patients to be directly hospitalized on the Clinic for oncology, where they will get an adequate specialist report and oncological treatment. Involvement of spine (orthopedic-traumatology) surgeon is completed when he provides the material for PH analysis and prescribes an adequate spine orthosis. He can be engaged again if the patient’s life expectancy is longer in order to plan and perform the procedure of decompression and stabilization.

Spine metastases at the patients of different age, TNM stage, pathohistology, neurological and general condition are unique therapeutic challenge with high complication rates. If life expectancy is short (3-6 mo.), and our strategy is to prevent further vertebral collapse and perform a biopsy, then vertebroplasty is most suitable. If life expectancy is longer (6-12 mo) the posterior spondylodesis is better. If we face acute neurological deficit caused by metastasis, an urgent local irridation, which is successful in about 80% of patients. All above mentioned procedures are relatively noninvasive and cause no higher morbidity. If the tumor is recommended solitary and has low level of aggressivity (G0, G1) then it is reasonable to perform more radical surgical procedure, aiming to eradicate a tumor, restaurate the stability of spine and achieve a full recovery. Those procedures consist of posterior or anterior vertebral resecion with reconstruction with bone cement, polyethylene, metal spacers, endoprostheses, homotransplants, etc. At hipevascular tumors (kidney and thyroid) it is necessary to perform preoperative embolisation of tumor.
Conclusion

Despite the presence of many other metastases, spinal metastases are most common symptomatic metastases. Therefore, an orthopedic-spine surgeon is expected to be the leader of consilium, organized for those patients. Percutaneous spine biopsy allows the acceleration of diagnostic procedure and, as soon as possible, the beginning of definite therapy.

References


Perkutana biopsija tumora kičme

APSTRAKT

Mnogi maligniteti u starijoj životnoj dobi se prvo manifestuju patološkim lomom kičme. Obzirom na kompleksnost tumorskih oboljenja i ozbiljnost dijagnoze prijeloma kičme potrebno je što prije završiti stage-ing tumora i odrediti njegov histološki karakter. U ovom radu prikazujemo seriju pacijentata kojima je izvršena perkutana biopsija tumora u lokalnoj. Uključujući faktori su bili RTG, CT ili MR dokazani patološki lom torakalnog ili lumbalnog pršljena nepoznatog porijekla. Kod ukupno 25 pacijenata, iglenom biopsijom pod kontrolom CT u lokalnoj anesteziji izvršena je biopsija, a kod njih 21 je potvrđen PH nalaz nekog od malignoma (84%). Kod ostalih 4 tkivni uzorak je bio nereprezentativan, i pretraga je morala biti ponovljena. Nakon dobivanja PH nalaza, od pomenutih 25 pacijenata u konačnici, zahvat na kičmi je bio indiciran kod samo 8 pacijenata (32%). Ostali su imali uznapređenu metastatsku bolest sa agresivnijim tipovima tumora i njima je bila indicirana samo hemo i radioterapija (nizak Tomita score i kratak life expectancy).

Pored brojnih drugih metastaza, najčešća simptomatska metastaza je spinalna. Zbog toga se zahtijeva od ortopeda-traumatologa da preuzme vodstvo konzilija za liječenje ovih pacijenata, koje po prirodi stvari pripada onkologu. Perkutana biopsija tumora kičme omogućuje da se znatno ubrza obrada onkoloških pacijenata i što prije opočne sa ciljanom onkološkom terapijom.

KLJUČNE RIJEČI:
metastaza, kičma, biopsija, patohistogija, igla