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Case Report Open Access

Emergency (Ad Hoc) Stabilization of The Anterior Vertebral Column with Two Combined Synex Implants After Two-Level Vertebrectomy L2 and L3. Case Report and the Technique Description

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Abstract

Case report of the patient who underwent two-stage surgical treatment due to pathological fracture of vertebral column (L3 due neoplasm infiltration) in the course of kidney cancer is presented. Decompression of vertebral canal from the posterior approach in lumbar segment (L3 and partially L2) was performed due to sudden neurological functions impairment. Lumbar segment of vertebral column was stabilized via the transpedicular approach with Clix system (Synthes). In the second stage anterior approach via laparotomy was performed, urological team excised the kidney tumour, the next team vascular surgeon and neurosurgeon, performed resection of L3 and L2 vertebras (L3 was pathological fractured and compressed of cauda equine structures, L2 was partially cancer infiltrated). During the attempt of anterior column stabilization it was found, that the longest vertebral prosthesis of Synex set (Synthes) is shorter than the distance measured between L1 and L4 vertebras for about 5-7 mm.

The anterior column stabilizing set consisting of two vertebral prostheses from Synex set connected permanently with the crosspieces – crossbars rods used in transpedicular stabilizations was constructed *ad hoc* using the available elements. Stable set ready to use was obtained. After preparation, the set was placed between the vertebral bodies, than extended .Control X -ray revealed its appropriate location and supporting function. The *ad hoc* formed set of such type could be only used in normal transpedicular posterior stabilization of the vertebral column, Distance between the vertebral bodies after the resection probably resulted from the constitutional patient traits (app. 200cm tall) The patient was assessed in Out Patient Clinic, his life was improved after the operation, was independently, Lovett score 4/ 5. After the operation was performed four courses of chemotherapy during 18 months.

Case History and Description of Method

33 year -old patient K.D., app. 200 cm tall, was admitted to the neurosurgery clinic due to neurological deficit of minor grade within the lower extremities without sphincters dysfunction. MRI diagnostics revealed pathological infiltration of vertebral bodies of L3 and partially L2, pathological fracture of L3 vertebral body with narrowing of the vertebral canal (Figure 1). Patient was prepared for operational treatment, bed resting was recommended. On the second day of hospitalization in late hours sudden increase of neurological deficit and sphincters impairment were observed. Patient was qualified for operational treatment in the emergency condition.

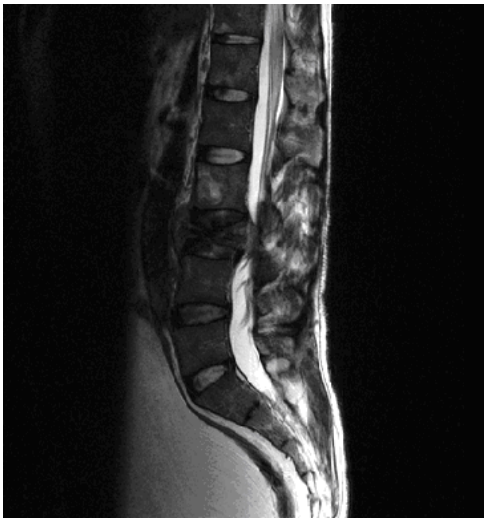

Figure 1: MRI of lumbosacral segment before posterior decompression.

The decompression of vertebral canal with laminectomy and partial facetectomy were performed. Neoplastic infiltration was observed. Specimens of tumour tissues for histological examination were collected. Patient was stabilized with transpedicular stabilization two levels above and below the operated region that is on L2-L3 level. Clix system (Synthes) was used, consisting of two rods, strengthened additionally with two crossbars giving the shape of framework (Figure 2a,2b) After the decompression the neurological status improved. Rehabilitation was implemented. Insignificant disturbances in wound healing were observed. In histological examination - *Adenocarcinoma renis clarocoellulare*. Diagnostics of abdomen and retroperitoneal space was broadened and kidney tumour was found**.** Patient was qualified for the operational treatment after urological consultation. The second operation could not be performed in the short time after the first operation due to circulatory decompensation after massive bleeding from the lower part of gastrointestinal tract. Colonoscopy and rectoscopy revealed hemorrhagic ulcerations within the rectum. Patient obtained intravenous nutrition (Cabiven) and supplementation

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of blood. As the parameters were balanced and transfusions were performed, patient was qualified for the further treatment.

Patient underwent transpedicular stabilization before. In consequence, reconstruction of anterior column with use of Synex (Synthes) was performed after the resection of the vertebral bodies. Unfortunately, during the measurement the biggest Synex prosthesis was too short in the longest dimension on maximal extension for 5-6 mm.

Ad hoc decision to stabilize anterior column with prosthesis constructed of two vertebral body prostheses Synex I, connected permanently with the rods (crosspieces) used in transpedicular stabilizations, was made. Crosspieces bars were cut to optimal length exceeding about 5-6 mm on each end of the distance length between the L1 and L4 vertebras. Two symmetrical foramen (burr hole) were made axially in the projection of the vertebral body prosthesis footprint

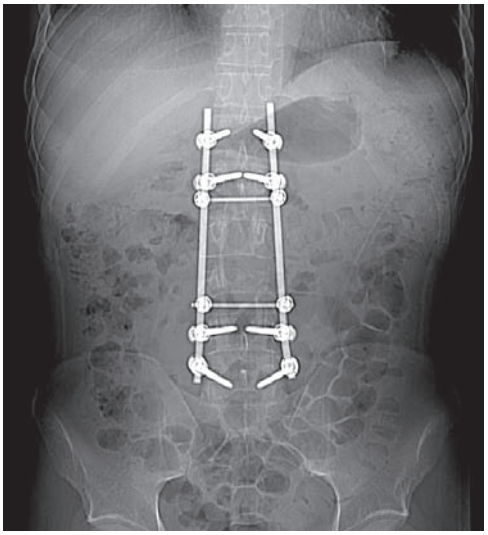

Figure 2a: X ray of lumbosacral segment, postoperative control examination (first operative session).

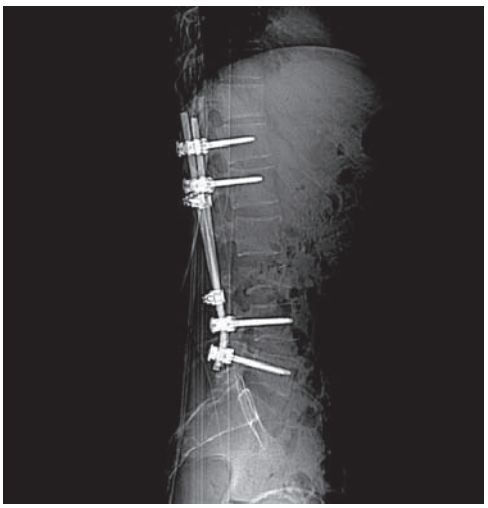

Figure 2b: X ray of lumbosacral segment, postoperative control examination (first operative session).

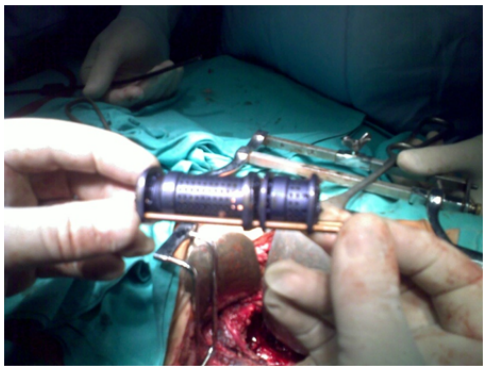

Figure 3a: Two interconnected prostheses of vertebral bodies Synex.

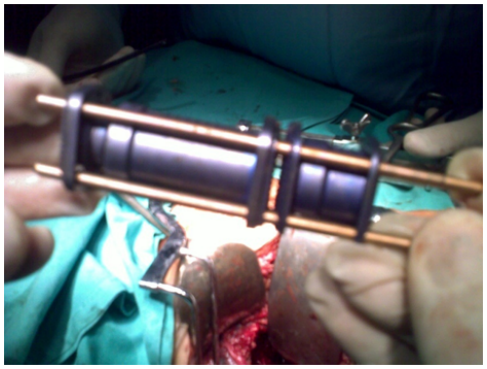

Figure 3b: Two interconnected prostheses of vertebral bodies Synex.

with a high-speed drill on the surface of the vertebral body adjacent to the resection area. The depth of foramen was drilled exceeding 1 cm in L1 vertebral body. In consequence, additional system fixing nests between the bodies were obtained. Bleeding from the bone was stopped with bone wax.

Stiffness of vertebral column axis, stability of vertebral bodies and constant distance between the L1 and L4 vertebras were observed. Two prostheses of vertebral bodies Synex I of catalogue the first no. 495.317, with extension range of 26-36 mm and the second one of catalogue No. 495.327, with extension range of 45-73 mm were initially combined by rods placed in the foramina in the upper and lower footprints of the vertebral body prostheses. Elimination of fixing teeth was additionally performed on the footprint of one prosthesis with the help of diamond drill to obtain more precise contact of two adjacent footprints of neighbouring prostheses. Such excavations matched to the teeth of adjacent prosthesis. The construction described above, protected against displacement, dislocation and rotation of elements within the system (Figure 3a,3b,3c).

Two rods were initially inserted into the L1 vertebral body in the prepared bone burr hole puncture, deeper in the bone. Then the shorter prosthesis was fixed in basic position. Finally, the longer prosthesis was stretched on the rods in the basic position. Rods that were inserted deeper in the L1 vertebral body were slightly pulled out and inserted into the prepared by drilling the burr holes in L4 body. In next step both prostheses were distracted with the help of distracter obtaining persistent intervertebral wedging. Rods were kept in optimal position during prostheses stretching to obtain translocation of prostheses on

the rods. The system was axially wedged between the vertebral bodies. Superficial milling of the place of contact of implants foramina and rods with high - speed drill was performed to fix elements. Rod was inserted to prevent against translocation. Operation was finished with drainage of place after kidney resection and place adjacent to the implant.

In one week observation improvement within the functions of lower extremities was noticed. Control X ray examination of operated segment of vertebral column was performed to check the prosthesis position. After sitting position of the patient in the wheel chair was performed the X- ray examination after 2 months post surgery (Figure 4a,4b).

Patient was referred to the Chemotherapy Clinic for further treatment. Patient was assessed in Outpatient clinic, his neurological status after decompression was totally improved. Patient moved independently without outside support, was referred to rehabilitation too, his quality of life was improved. Lovett score 4/5. In Chemotherapy department four courses of chemotherapy was performed during 18 months. Because of generalisation of neoplasma process patient was died 18 months after surgical therapy.

Figure 3c: Two interconnected prostheses of vertebral bodies Synex.

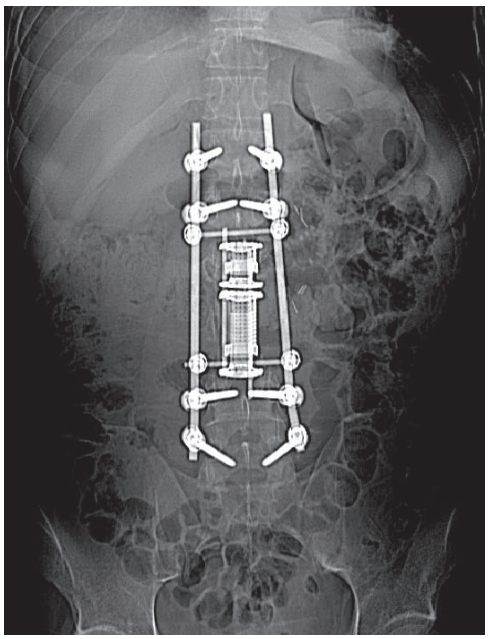

Figure 4a: X ray of lumbosacral segment, postoperative control examination, after two months.

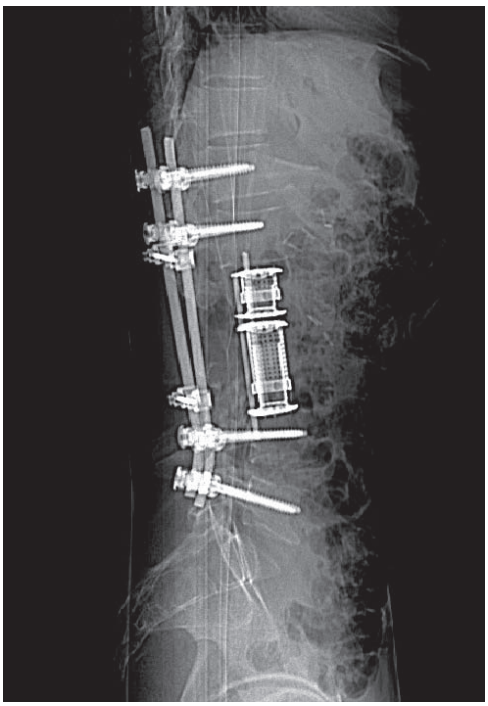

Figure 4b: X ray of lumbosacral segment, postoperative control examination after 2 months.

Discussion

Reconstructive surgery of spine in the group of oncological patients influence on; quality of live, perspectives and progress of treatment [1-3,11,25,36]. In the first step of treatment posterior decompression of vertebral canal on L2 and L3 level was performed. Operation was performed in emergency conditions in aim to maintain neurological functions of young patient. Range of operation was limited to posterior decompression and transpedicular stabilization. The spinal canal and cauda equina structures were compressed from the front and we observed not satisfactory improved neurological deficit in lower extremities after the operation. We decided to decompress spinal canal via anterior approach. Anterior surgery is indicated when additional anterior column support or decompression of dural sac are needed [1,2, 4,5,9,11,16,20,22,24,26,27,32,33,35], like in this case. The anterior access combined with resection of kidney tumour was planned; such extensive procedure in emergency condition could not be performed. Extensive loss within the anterior column of the spine was observed after the performed resection of the L2 and L3 vertebral bodies. The L3 vertebrae body was removed and spinal canal was decompressed. We observed that the lower part of L2 vertebrae was cancer infiltrated and because we recognised in situ, possible, not adequate supporting of anterior column after only L3 vertebral body resection and only on this level prosthesis implantation. We were concerned about appropriate reconstruction of anterior column. [10,14,17,28-30] Resection of L2 vertebral body was performed additionally, we performed intraoperative decision because footprint of the prosthesis should be appropriate supported .

We using the Synex Systems and agree with the recommendation and opinions of others users [13,18,19,21,23,34,37]. Reconstructing Synex I system (Synthes) was available. Its manufacturer recommends implants set for the reconstruction of two removed vertebral bodies.

Deficit of distance of 5-6 mm on maximal extension of prosthesis during the measurement of the longest implant to support vertebral column was observed. It was a difference between the longitudinal dimension of post resection site and of implant. In *ad hoc* analysis decision to combine two implants as mentioned in the method description was made. Good effect of anterior column reconstruction was obtained. We didn't recognise the using of titanium mesh to reconstruction of anterior column because we supposed inadequate reaction for the axial loading after extensive resection and inappropriate cancer infiltrated bone material [6-8,12,15,31].

Possible cause of potential failure with overdistraction on transpedicular stabilization was considered. However, excessive distraction of lumbar segment was not observed. The potential cause of the failure was rather caused by constitutional traits of male of about 200 cm tall.

Results

1. System of anterior column reconstruction and stabilization created *ad hoc* with the use of elements of transpedicular stabilization (two crosspieces) and two prostheses of vertebral bodies from the set (Synex I. Synthes) was presented.

2. Suggested stabilization system - reconstruction of anterior column may be used only when normal, effective posterior stabilization of vertebral column is obtained.

3. In exceptional cases: very high height of patient, high vertebral bodies, maintained intervertebral discs in young adults, proper measurements of excised space must be performed before the operation.

4. Excessive distraction of the vertebral column during the transpedicular stabilization may be also a cause of failure of standard implants use.

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