ANTERIOR OR POSTERIOR STABILIZATION FOR PRIMARY AND METASTATIC SPINAL TUMORS

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Vertebral column is one of the most frequent sites that metastatic malignant tumors are seen. Primary spinal tumors and metastatic tumors decrease the resistance of vertebral column and results in progressive painful spinal deformities. In this study a sum of 9 patients with 2 primary vertebral tumors, 5 metastatic tumors and 2 medulla spinalis originated tumors were evaluated. Five patients were female and 4 were male. Seven patients had pathological fractures while and the other two patients with medulla spinalis tumor had instability because of facetectomy and complete laminectomy. Posterior instrumentation was performed in 6 (CDI: 1, Hartshill: 1, TSRH: 4) patients and 3 had anterior instrumentation (AO-CLP: 1, Kaneda: Z-plate: 1). The mean sagittal index which was 28.3° was corrected by 59.9%. Physiological sagittal contours were provided in al patients and their functional capacities were significantly increased. In light of these findings it is thought that posterior and anterior instrumentation is very important in the treatment of painfull instabilities to provide a functional life without pain in primary or metastatic spinal tumors.

INTRODUCTION

Tumors involving the vertebral body may be benign or malignant. In the adult population, most primary tumors of the spine are malignant (1). After the lung and the liver, the skeletal system is the most common site of cancer metastasis (2). Breast, prostate, lung and renal carcinoma are the most common tumors that disseminate to the skeletal system (3). The spine is the most common site of skeletal metastatis (4). Most patients with metastatic lesions presented between 50 and 60 years of age, and there was no difference with regard to sex of the patient (3).

There are several well-accepted indications for surgical intervention in the treatment of spinal tumors. These are (1) intractable pain unresponsive to nonoperative measures such as bracing and radiotherapy, (2) progressive neurologic changes during or after radiotherapy, (3) the presence of a radioresistant tumor, (4) the need for specimen to make a histologic diagnosis, (5) decompression of the neural elements with debulking of the tumor mass, (6) spinal instability or major destruction of vertebral bone architecture (3).

In this study, 9 patients with spinal instbility due to pathologic fractures or caused by bilateral facetectomy for tumor excision are presented and discussed in light of the findings in the literature.

PATIENTS AND RESULTS

In this study a sum of 9 patients with 2 primary vertebral tumors, 5 metastatic tomours and 2 medulla spinalis originated tumours are evaluated. Five patients were female and 4 were male. Seven patients had pathological fracture and two of these had bilateral facetectomy and complete laminectomy after medulla spinalis tumor. Mean age was 46.4 (7-66).

Primer indications for surgery were excision of painfull lesions and instability which was caused pathological fractures and bilateral facetectomy. One of the primary tumors was benign was hemangioma, at L1 vertebra body and remaining one was eosinofilic granuloma at T12. Original lesions of metastatic tumors were lung, prostate and breast cancers. 2 medulla spinalis originated tumors were ependymoma and schwannoma. Posterior instrumentation was performed in 6 (Cotrel-Dubousset Instrumentation: 1, Hartshill: 1, Texas Scottish Rite Hospital: 4) patients and 3 had anterior instrumentation (AO Cervical Locking Plate: 1, Kaneda Device: 1, Anterior Texas Scottish Rite Hospital Instrumentation: 1). The mean sagittal index of the pathologic fractures which was 28.3° was corrected by 59.7%. Physiological sagittal contours were provided in al patients and their functional capacities were significantly increased.

DISCUSSION

Prior to recommending operative intervention, several factors should be considered. The surgeon must determine whether the patient is an appropriate surgical candidate. The person's immunologic, nutritional and pulmonary status should be evaluated and the life expectancy should be taken into consideration (3). In this study, nine primary or secondary spinal tumors

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Table 1. The clinical, radiological and surgical evaluation of the patients.

No.	Name	Age	Sex	Clinical Evaluation	Neurologic Status	Radiological Evaluation	Indications	Type of Operation
1	FG	56	Female	Back pain	Bilaterally paraparesis	*Lytic lesion of the T-7, 9, 12 compression Pathologic fracture at T-12 level	*Decompression *Correction of *Instability	*Anterior decompression+ *Posterior Instrumentation
2	HY	59	Male	Low back pain	Billaterally parasthesia+ paraparesis	*Lytic lesions at L1 level *Pathologic Winking owl sign	*Decompression *Correction of sagittal contours	*Anterior decompression+ fibular graft Instrumentation
3	AK	66	Female	Low back pain	Normal	*Cystic lesions at L-1 Level *Positive vertebral angiography *Positive MRI Pathologic fracture	*Correction of sagittal contours *Instability	Posterior Instrumentation
4	NS	51	Female	Low back pain	Frankel A	*Osteolytic lesions at L-3 level *Pathologic fracture	*Decompression *Correction of sagittal contours Instability	*Anterior decompression *Anterior Instrumentation
5	BE	22	Female	Low back pain	Bilaterally Parasthesie	*Positive MRI	*Instability after facetectomy bilateraly a from T12 to L13 levels	*Posterior Instrumentation
6	ŞÖ	7	Male	Neck pain	Bilaterally parasthesia and paraparesis	*Lytic lesions at C-6 level *Minimal spinal spinal cord compression *C6-7 fracture dislocation	*Decompression *Correction of sagittal contours *Instability	*Anterior decompression *Anterior Instrumentation
7	NB	55	Male	Back pain	Bilaterally parathesia and paraparesis	Ostheoblastic lesions at T9 and T12 levels Pathologic fracture	*Decompression *Correction of sagittal contours Instability	*Posterior Decompression *Posterior decompression
8	AKK	45	Male	Back pain	Frankel B	*Positive MRI	*Instability	*Posterior Instrumentation
9	ED	57	Female	Low back pain	Normal	*Ostheoblastic lesion at L2 level *Pathologic fracture *Minimal chord compression	*Decompression *Correction of sagittal contours *Instability	*Anterior decompression *Anterior Instrumentation

Instrumented mobie segments	Type of Instrumentation	Hystopathologic Diagnosis	Complications	Preoperative Sagittal Index	Postoperative Sagittal Index	Correction Percentages (%)	Survival
5	CDI	Oat Cell Lung Cancer	None	26°	12°	53.9°	24 months
4	Harthshill Rectangle - SSI	Adenocarsinoma	None	30°	15°	50	19 months
6	TSRH	Hemangioma	None	30°	4°	86.6	Alive
2	TSRH	Adenocarsinoma Lung	None	-	-	-	Alivea
6	TSRH	Ependymoma	None	-	-	-	Alive
3	AO-CLP	Eosinophilic	None	-	-	-	Alive
4	TSRH	Prostate Cancer	None	28°	13°	53.6	Alive
4	TSRH	Schwannoma	None	-	-	-	Alive
3	Kaneda Device	Breast Cancer	None	28°	14°	50	Alive

were evaluated. Their white blood cell count was more than 4000 and platelet count was more than 100.000. There were not nutritional problems. Their life expency was more than 6 months and pulmonary function tests were normal.

The goals of operative intervention are to relieve the patient's pain, to preserve or improve neurologic dysfunction, and to stabilize the patient's spine so that mobilization can be accomplished without an external orthosis (5).

For more agressive tumors such as myeloma which may involve all three columns of the spine one needs to decide whether to approach these posteriorly or anteriorly or anteriorly and posteriorly (two approaches). The surgical approaches for spinal decompression can be divided into these that provide access anterior (vertebral body resection), posterior (laminectomy) or lateral to the thecal sac. The feasibility of different approaches depends on the location and extend of neural impingement, the number of vertebrae involved, the region of the spine affected, the need for spinal stabilization and the patient's medical condition. Metastatic lesions that rise from spinal stabilization and the patient's medical condition. Metastatic lesions that rise from a vertebral body typically result in epidural compression that is either anterior or anterolateral to the thecal sac. They can be effectively removed following vertebral body resection (3). This technique was first reported by Bailey and Badgley in 1960 (6). In this study, in the patients with neurologica deficite, anterior (in 5 patients) or posterior (in 2 patients) decompression was done, absolutely.

Surgical stabilization has been recommended when vertebral body collapse is greater than 50%. Spinal tumoral instability is though to present in two forms; axial compression and translation (subloxation and dislocation) (3).

Kostuik has designed an instrumentation system that consists of two vertebral screws placed in each intact vertebral body and connected by two laterally placed rods-one in distraction and in compression (7). Several instrumentation are commonly used posteriorly for the treatment of metastatic disease of the spine. Luque instrumentation was initilly introduced for the treatment of neuromuscular spinal deformity but was also used for spinal tumors (8).

The recent segmental instrumentation system to gain acceptance in the treatment of spinal deformity is the Cotrel-Dubousset Instrumentation. Multiple hooks and vertebral screws are attached in different position to a knurled rod, which allows the surgeon to apply both distraction and compression forces in varying combinations along the same rod (9).

The new same instrumentation is Texas Scottish Rite Hospital system. With TSRH "Crosslinked" plates, a rigid frame was constracted, and also wa used anteriorly (10).

All of the patients had spinal instability caused of pathological fracture or facetectomy and complet laminectomy bilaterally. Purpose to obtain to spinal stability, posterior instrumentation (CDI, Hartshill-SSI and TSRH) in 6 patients and anterior instrumentation (AO-CLP, TSRH and Kaneda Device). Sagittal indxes of the patients with pathologic fractures were brought to physiologic limits with correction of 59.7%. With anterior plates and posterior rectangular frames, a rigid fixation was obtained for spinal stability.

Bone grafts used in metastatic disease have been obtained from iliac crest, rib, tibia and fibula. To achieve long-term stability, bone grafting can be performed at the time of the anterior procedure by placing cancellous bone or a piece of resected rib (3). In this study fibular grafts or rib were used as an anterior strut. For posterior fusion, autologous iliac graft was performed.

In light of these findings it is thought that posterior and anterior instrumentation is very important in the treatment of painfull instabilities to provide a functional life without pain in the primary or metastatic spinal tumors.

REFERENCES:

1. Bridwell KH, Ogilvic JW: Primary tumors of the spine. In: The Textbook of Spinal Surgery. Eds.: Bridwell KH, DeWald RL, JB Lippincott, Philadelphia, 1991k, pp: 1143-1176.
2. Boland PJ, Lane JM, Sundareson N: Metastatic disease of the spine. Clin Orthop, 169: 95, 1982.
3. Abdourian PL: Metastatic Disease of the Spine. In: The Textbook of Spinal Surgery. Eds.: Bridwell KH, DeWald RL, JB Lippincott, Philadelphia, 1991, pp: 1187-1241.
4. Berretoni BA, Carter JR: Mechanism of cancer metastasis to bone. J Bone Joint Surg, 68A: 308, 1986.
5. DeWald RL, Bridwell KH, Prodroman C, Rodts MF: Reconstructive spinal surgery as palliation for metastatic malignancies of the spine. Spine, 10: 21, 1985.
6. Bailey RW, Badgley CE: Stablization of the cervical spine for anterior fusion. J Bone Joint Surg, 42A: 565, 1960.
7. Kostuik JP: Anterior spinal cord decompression for lesions of the thoracic and lumbar spine: techniques, new methods of internal fixation results. Spine, 8: 512, 1983.
8. Luque ER: The anatomic basis and development of segmental spinal instrumentation. Spine, 7: 256, 1982.
9. Chopin D: Cotrel-Dubousset Instrumentation (CDI) for adolescent and pediatric scoliosis. In: The Textbook of Spinal Surgery. Eds.: Bridwell KH, DeWald RL, JB Lippincott, Philadelphia, 1991, pp: 97-162.
10. Ashman RB, Herring JA, Johnston CE: Texas Scottish Rite Hospital (TSRH) Instrumentation System. In: The Textbook of Spinal Surgery. Eds.: Bridwell KH, DeWald RL, JB Lippincott, Philadelphia, 1991, pp: 219-248.