

SURGICAL OUTCOMES OF PRIMARY SPINAL TUMORS

D.A. Ptashnikov

Professor, head of spine surgery & oncology of
Russian Scientific Research Institute of Traumatology and Orthopedics named
after R.R. Vreden

head of orthopedic department of
Nord-West State Medical University named after I.I.Mechnikov

AO Masters Symposium – Spinal Tumor and Infection

Istanbul, Turkey , October 25-26, 2013

SURGICAL OUTCOMES OF SPINAL TUMORS

- Tumor recurrence
- Malignisation (sarcomatous degeneration) of benign tumors
- Spreading with metastasis
- Survival rate
- Pain relieve
- Neurological improvement
- Ability of patients
- Life quality
- Surgical complications

FACTOR AFFECTING THE SURGICAL OUTCOMES OF SPINAL TUMORS

- Type of tumors
- Localization
- Size
- Spreading
- Clinical presentation
- Type of surgery
- Patients condition
- Learning curve of techniques & specialists...

TYPE OF PRIMARY TUMORS

BENIGN

Eosinophilic Granulomas (Langerhans Cell Histiocytosis)

- The best treatment is unknown (surgery rarely indicated)

Osteoid Osteoma

- Recurrence is unlikely if it was totally removed
- Complete pain relief & spontaneous deformity correction for less than 15 months

Pettine KA, Klassen RA. Osteoid-osteoma and osteoblastoma of the spine.
J Bone Joint Surg Am 1986;68;354-361

TYPE OF PRIMARY TUMORS

BENIGN

Osteoblastoma

- Recurrence rate (after internal curettage or marginal en bloc excision) – 10%

Lucas DR, Unni KK, McLeod RA et al, Osteoblastoma: clinicopathologic study of 306 cases.
Hum Pathol 1994;25;117-134

Osteochondroma

- Recurrence rate extremely low, but some facts of regrowth after subtotal excision has been reported

Albrecht S, Crutchfield JS, SeGall GK. On spinal osteochondromas.
J Neurosurg 1992;77;247-252

TYPE OF PRIMARY TUMORS

BENIGN

Aneurysmal Bone Cyst

- Recurrence rate (after all type of treatment) – 5-10%

Papagelopoulos PJ, Currier BL, Shaughnessy WJ, et al.
Aneurysmal Bone Cyst of the spine. Management and outcome.
Spine 1998;23;621-628

Giant Cell Tumor

- Recurrence rate after subtotal resection – 80%
- Recurrence rate after en bloc excision < 25%
- Incidence of pulmonary metastases ranges from 2% to 9%

Hart RA, Boriani S, Biagini R, Currier B, Weinstein JN.
A system for surgical staging and management of spine tumors.
A clinical outcome study of giant cell tumors of the spine. Spine 1997;22;1773-1782

Aggressive "benign" primary spine neoplasms: osteoblastoma, aneurysmal bone cyst, and giant cell tumor. Harrop JS, Schmidt MH, Boriani S, Shaffrey CI. Spine (Phila Pa 1976). 2009 Oct 15;34(22 Suppl):S39-47

Primary malignant tumors of the spine. Sundaresan N, Rosen G, Boriani S. Orthop Clin North Am. 2009 Jan;40(1):21-36

TYPE OF PRIMARY TUMORS

MALIGNANT

Multiple Myeloma and Plasmacytoma

- Rare surgery indicated
- Survival with multiple myeloma is 28 months
- Survival solitary plasmacytoma exceeds 60 months
- Solitary plasmacytoma of the spine, long-term remission can be expected with local treatment alone (bisphosphonate therapy and thalidomide/dexamethasone combination treatment)
- Pain relieved >80% after kyphoplasty/vertebroplasty
- 10% death rate in the early stages

Aggressive "benign" primary spine neoplasms: osteoblastoma, aneurysmal bone cyst, and giant cell tumor. Harrop JS, Schmidt MH, Boriani S, Shaffrey CI. Spine (Phila Pa 1976). 2009 Oct 15;34(22 Suppl):S39-47

Primary malignant tumors of the spine. Sundaresan N, Rosen G, Boriani S. Orthop Clin North Am. 2009 Jan;40(1):21-36

TYPE OF PRIMARY TUMORS

MALIGNANT

Lymphoma

- Rare surgery indicated
- After decompression - chemotherapy before radiation therapy

Primary bone tumours of the spine: a 42-year survey from the Leeds Regional Bone Tumour Registry. Kelley SP, Ashford RU, Rao AS, Dickson RA. Eur Spine J. 2007 Mar;16(3):405-9.

Primary malignant tumors of the spine. Sundaresan N, Rosen G, Boriani S. Orthop Clin North Am. 2009 Jan;40(1):21-36

Ewing's Sarcoma

- No convincing evidence of local control improving by surgically
- Surgery should be reserved for neurological complication & deformity
- 5-year survival rates 33-48%

Grubb MR, Currier BL, Pritchard DJ, Ebersold MJ. Primary Ewing's sarcoma of the spine. Spine 1994;19:309-313

Venkateswaran L, et al. Primary Ewing's sarcoma of the vertebrae: clinical characteristics, prognostik factors, and outcome. Med.Pediatr Oncol 2001; 37:30-35

TYPE OF PRIMARY TUMORS

MALIGNANT

Osteosarcoma

- En bloc surgical excision prolonged tumor free survival
- Median survival (with complete aggressive treatment) – 23 month

Talac R, Yaszemski MJ, Currier BL, et al., Relationship between surgical margins and local recurrence in sarcomas of the spine. Clin Orthop Relat Res 2002;397:127-132

Ozaki T, Flege S, Liljenqvist U, et al. Osteosarcoma of the spine: experience of the cooperative Osteosarcoma Study Group. Cancer 2002; 94:1069-1077

Chordoma

- Surgery is the method of choice
- Inadequate surgical treatment with tumor recurrent is frequent.
- 5-years survival rates - 50%
- 10-years survival rates - 28%

Boriani S, Chevalley F, Weinstein JN, et al. Chordoma of the spine above the sacrum. Treatment and outcome in 21 cases. Spine 1996;21:1569-1577

Cummings BJ, Hodson DI, Bush RS. Chordoma: the result of megavoltage radiation therapy. Int J Radiat Oncol Biol Phys 1983;9:633-642

TYPE OF PRIMARY TUMORS

MALIGNANT

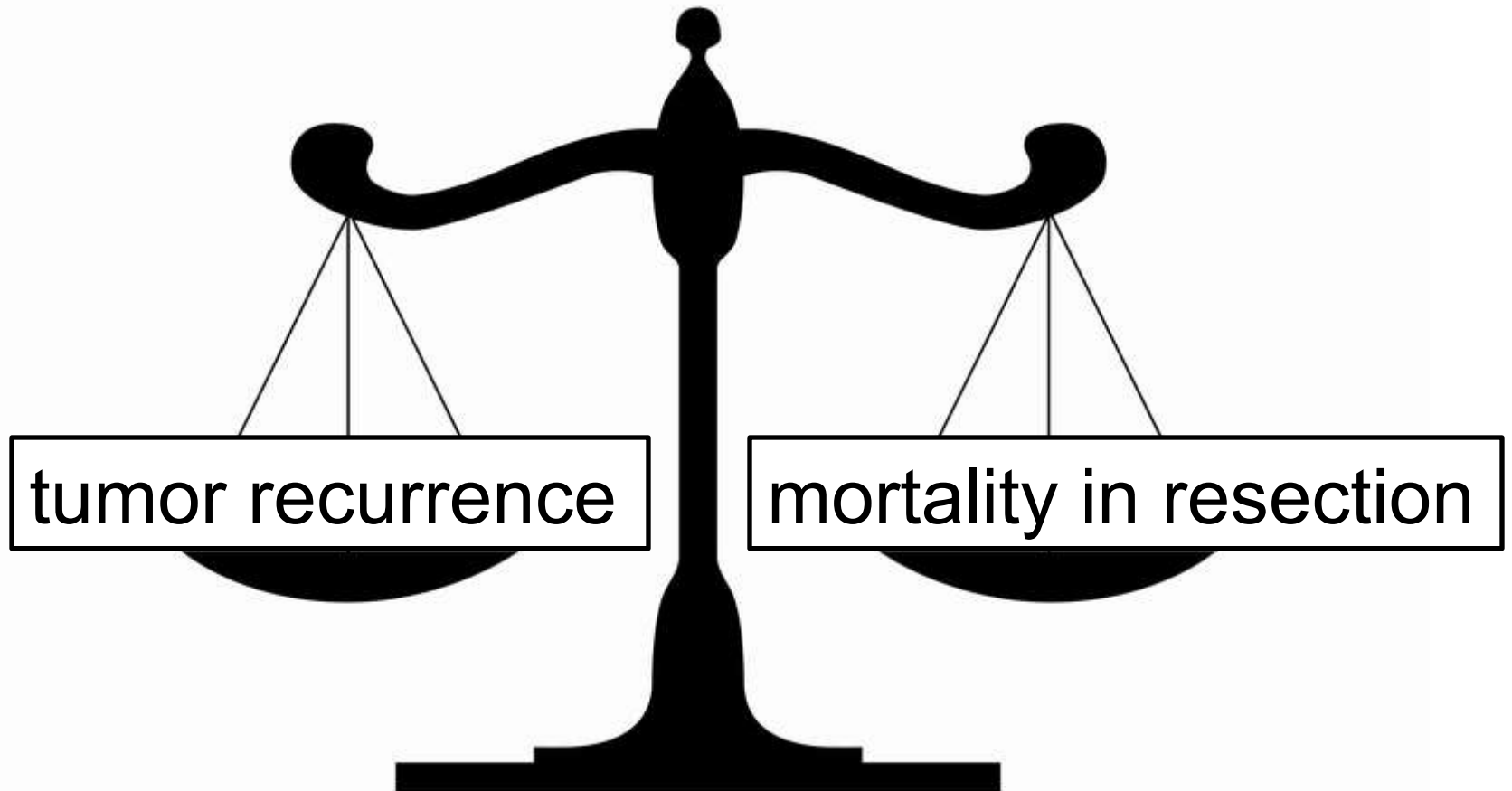
Chondrosarcoma

- En bloc surgical excision is the method of choice with recurrence rate 0-20%
- Intralesional curettage is associated with 70-100% recurrence
- 60% of patients die after 1.5 years after recurrence
- 5-years survival rates - 64%
- 10-years survival rates - 40%

Boriani S, De Iure F, Bandiera S, et al. Chondrosarcoma of the mobile spine: report on 22 cases. Spine 2000;25:804-812

York JE, Berk RH, Fuller GN, et al. Chordosarcoma of the spine: 1954 to 1997. J Neurosurg 1999;90 (1 suppl):73-78

RECURRENCE



RECURRENCE

Local recurrence of primary bone tumors of spine resulted in disease progression and death in 92% of cases

- Adequacy of the surgical margins at the time of definitive surgery
- Marginal means that the surgeon has operated along the layer of reactive tissue that surrounds the tumor (pseudocapsule)
- “Radical” margins are impossible
- Radiation and chemotherapy for incomplete surgical resection (excluding resistant)

Feasibility and safety of en bloc resection for primary spine tumors: a systematic review by the Spine Oncology Study Group. Yamazaki T, McLoughlin GS, Patel S, Rhines LD, Fourney DR. Spine (Phila Pa 1976). 2009 Oct 15;34(22 Suppl):S31-8

Surgical management of primary bone tumors of the spine: validation of an approach to enhance cure and reduce local recurrence. Fisher CG, Saravanja DD, Dvorak MF et al. Spine (Phila Pa 1976). 2011 May 1;36(10):830-6

LOCAL RECCURRENCE AND MORTALITY OF MALIGNANT LESIO

	Surgical margin as recommended by the Enneking Classification		Surgical margin not recommended by Enneking Classification		Total
	Alive	Deceased	Alive	Deceased	
No local recurrence	39(92.9%)	11 (57.9%)	15(34.9%)	2(6.9%)	67
Local recurrence	3(7.1%)	8(42.1%)	28(65.1%)	27(93.1%)	66
Total	42	19	43	29	133

Surgical management of primary bone tumors of the spine: validation of an approach to enhance cure and reduce local recurrence. Fisher CG, Saravanja DD, Dvorak MF et al. Spine (Phila Pa 1976). 2011 May 1;36(10):830-6

LOCAL RECCURRENCE AND MORTALITY OF MALIGNANT LESIO

	Surgical margin as recommended by the Enneking Classification		Surgical margin not recommended by Enneking Classification		Total
	Alive	Deceased	Alive	Deceased	
No local recurrence	39(92.9%)	11 (57.9%)	15(34.9%)	2(6.9%)	67
Local recurrence	3(7.1%)	8(42.1%)	28(65.1%)	27(93.1%)	66
Total	42	19	43	29	133

Surgical management of primary bone tumors of the spine: validation of an approach to enhance cure and reduce local recurrence. Fisher CG, Saravanja DD, Dvorak MF et al. Spine (Phila Pa 1976). 2011 May 1;36(10):830-6

COMPLICATIONS OF SURGICAL RESECTION

	Enneking Appropriate	Enneking Inappropriate	<i>P</i>
Complication			
Blood loss >5000 mL	23	2	<0.0001
Neurodeterioration	13	9	0.2427
Infection	11	4	0.0354
Serious non-wound infection	7	3	0.1421
Urinary and rectal incontinence	9	0	0.0012
Serious cardiac/ vascular incident	5	2	0.1963
Instrumentation failure	2	4	0.4743
Other	27	22	0.1990

Surgical management of primary bone tumors of the spine: validation of an approach to enhance cure and reduce local recurrence. Fisher CG, Saravanja DD, Dvorak MF et al. Spine (Phila Pa 1976). 2011 May 1;36(10):830-6

COMPLICATIONS OF SURGICAL RESECTION

	Enneking Appropriate	Enneking Inappropriate	<i>P</i>
Complication			
Blood loss >5000 mL	23	2	<0.0001
Neurodeterioration	13	9	0.2427
Infection	11	4	0.0354
Serious non-wound infection	7	3	0.1421
Urinary and rectal incontinence	9	0	0.0012
Serious cardiac/ vascular incident	5	2	0.1963
Instrumentation failure	2	4	0.4743
Other	27	22	0.1990

Surgical management of primary bone tumors of the spine: validation of an approach to enhance cure and reduce local recurrence. Fisher CG, Saravanja DD, Dvorak MF et al. Spine (Phila Pa 1976). 2011 May 1;36(10):830-6

THE MORBIDITY OF SURGICAL RESECTION

- Altered anatomy secondary to tumor growth
- Bleeding from the tumor or epidural veins
- Manipulation or sacrifice of vascular or nervous structures
- Fibrosis due to previous surgery
- Wound dehiscence or infection due to preoperative radiation therapy or inappropriate closure techniques

En bloc spondylectomy in malignant tumors of the spine. Liljenqvist U, Lerner T, Halm H, Buerger H, Gosheger G, Winkelmann W. Eur Spine J. 2008 Apr;17(4):600-9.

Feasibility and safety of en bloc resection for primary spine tumors: a systematic review by the Spine Oncology Study Group. Yamazaki T, McLoughlin GS, Patel S, Rhines LD, Fourney DR. Spine (Phila Pa 1976). 2009 Oct 15;34(22 Suppl):S31-8

SPREADING OF METASTASIS AND SURVIVAL

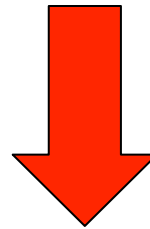
	without MTS	MTS
Osteosarcoma	11 months	7 months
Ewing sarcoma	26 months	20 months
Chondrosarcoma	37 months	22 months

Survival of patients with malignant primary osseous spinal neoplasms: results from the Surveillance, Epidemiology, and End Results (SEER) database from 1973 to 2003. Mukherjee D, Chaichana KL, Gokaslan ZL et al. J Neurosurg Spine. 2011 Feb;14(2):143-50

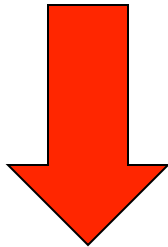
LIFE QUALITY

BEFORE TREATMENT

Physical components - **dominant**
(physical function, role physical, body pain)



Mental components - **secondary**
(vitality, social functioning, role emotional, mental health)



FALL

Primary malignant bone tumors and solitary metastases of the thoracolumbar spine: results by management with total en bloc spondylectomy. Melcher I, Disch AC, Khodadadyan-Klostermann C et al. Eur Spine J. 2007 Aug;16(8):1193-202.

LIFE QUALITY

AFTER TREATMENT

Spondylectomy

Physical components - **dominant**
(physical function, role physical, body pain)

Frankel score
↑ 1 or more stage

Mental components - **secondary**
(vitality, social functioning, role emotional, mental health)

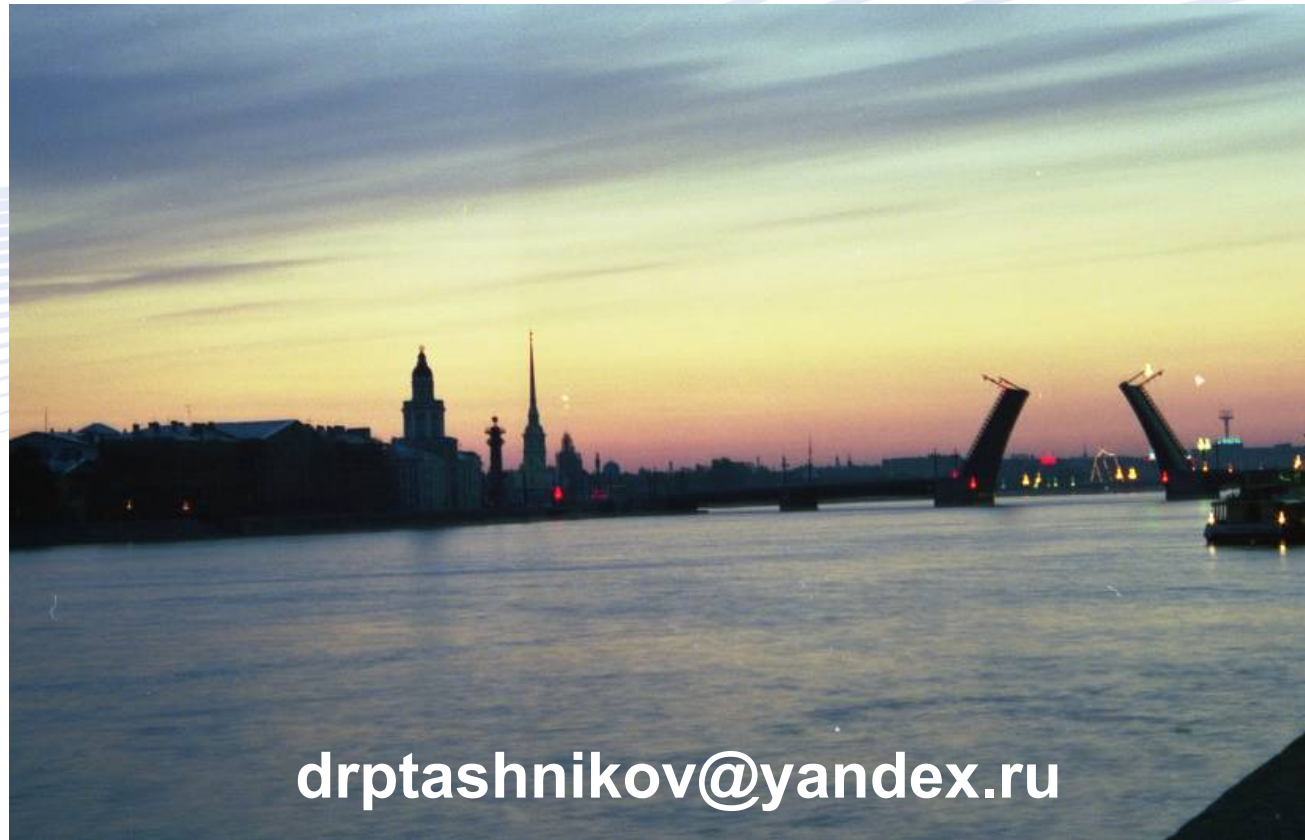
Primary malignant bone tumors and solitary metastases of the thoracolumbar spine: results by management with total en bloc spondylectomy. Melcher I, Disch AC, Khodadadyan-Klosternann C et al. Eur Spine J. 2007 Aug;16(8):1193-202.

Initial experience with the use of an expandable titanium cage as a vertebral body replacement in patients with tumors of the spinal column: a report of 95 patients. Viswanathan A, Abd-El-Barr MM, Doppenberg E et al. Eur Spine J. 2012 Jan;21(1):84-92.

TAKE HOME MESSAGES

- Ambiguity and difficulty in advancing the quality of care for these rare tumors
- Should be recorded in regional registries
- Optimal management - multidisciplinary team
- Patients selection for surgery
- Wide surgical margin increase the positive outcomes & ... The complication rate

Excellence in Spine



drptashnikov@yandex.ru