Prevalence of Primary Spinal Tumors: 15-Year Data from Siriraj Hospital

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Objective: *To determine prevalence, demographic data and clinical presentation of primary vertebral tumors.*
Material and Method: *A retrospective study of the primary spine tumor specimens from Siriraj bone tumor registry from 1996 to 2010.*
Results: *From the study, primary spinal tumors constituted 85 of 1,679 bone tumor cases (5.06%). The common benign spinal tumors were giant cell tumor and hemangioma. The common malignant spinal tumors were chordoma, chondrosarcoma, and osteosarcoma. The mean age of presentation was 44.68 years. Fifty-three percent of tumors occurred in females. Pain was the most common presenting symptom, occurring in 73.53% of malignant and 52.94% of benign tumors. Neurological involvement occurred in 25% of malignant tumor. Malignant lesions predominated in the sacral region while the most common location of benign specimens was thoracic region.*
Conclusion: *The present study was the first demographic study of primary spinal tumor in Thai showed variety of prevalence when compared with similar studies based on Western patients. Whether these results reflect differences in the population, race and data collection method.*

Keywords: *Primary spinal tumor, Vertebral tumor, Prevalence, Bone tumor, Thai*

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Primary bone tumors are uncommon that represent between 2.8-13% of all bone tumors[1]. However, the true prevalence is unknown because of lacking tissue diagnosis in benign lesions. The prevalence of primary spinal tumors in Thailand has not been well studied. The objective of this study was to obtain the data on the prevalence, demographics data of primary spinal tumors from Department of Orthopedics Surgery and Department of pathology, Faculty of Medicine Siriraj Hospital, during 15-year period.

Material and Method

This retrospective descriptive study that reviewed from Siriraj Bone Tumor Registry between January 1996 to December 2010. Patient's demographic data including gender, age, clinical presentation, duration of symptom, number and location of involvement were collected. The locations of involvement were divided into 5 levels (cervical, thoracic, lumbar, sacrum and coccyx). The pathological results were review and classified into two groups; benign and malignant tumors. The patients with hematologic malignancy were excluded in the present study. The data were analyzed by using SPSS and reported with descriptive statistics. Categorical data were compared with Chi-squared tests. Continuous data were compared with student t-tests. The present study was approved by the Ethic Committee of the Faculty of Medicine Siriraj Hospital (reference number EC038/2012).

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Results

Eighty-five primary spinal tumors that are 5.06% (85/1,679) of primary bone tumors were founded. The patient ages ranged from 5 to 94 years old with mean age of 44.68 years. Forty patients were male (47.05%). The most common location of specimens were from sacrum (n = 42/85, 48.27 %), thoracic and lumbar (n = 17/85, 20%). Chordoma was the most common tumor

(n = 33/85, 38.82%). The other common tumors were giant cell tumor (n = 10/85, 11.76%), and hemangioma (n = 8/85, 9.41%). The number of malignant spinal tumors (n = 56/85, 65.88%) was 2 times of the benign tumors. The common malignant tumors were chordoma (n = 33/56, 58.93%), chondrosarcoma (n = 6, 10.71%) and osteosarcoma (n = 6, 10.71%). The patients' mean age was 46.97 years while the mean age of benign tumor group was 35.65 years. The common benign tumors were giant cell tumors (n = 10/29, 34.48%), hemangioma (n = 8/29, 27.58%), osteoblastoma (n = 3/29, 10.34%), and osteochondroma (n = 3/29, 10.34%). The demographic data was shown in Table 1.

Malignant lesions predominated in the sacrum (n = 34/56, 60.71%), lumbar (n = 10/56, 17.86%) and thoracic region (10.71%, 6/56). While, the common location of benign specimens were thoracic (n = 11/29, 37.93%), sacrum (n = 8/29, 27.58%).

Pain was the most common presenting symptom (69.41%) that affecting 52.94% of the benign and 73.53% of the malignant tumors. Mass was the presenting feature in 16.47% of patients. Neurological involvement was seen only 5.88% of those with benign lesions (nerve compression) and 25% of patients with malignant tumors. However, the spinal cord compression in malignant tumors were found 41.18%.

Fifty-three percent tumors occurred in females. Malignant lesions significantly affected females (p = 0.031). This characteristic was reversed in benign tumors, where most of patients were males.

There were 14 children aged under 18 years with a mean age of 14.43 years, whereas the mean age of the adults was 50.73 years. Half of the children had benign tumors in contrast to the majority of adults in which 68% of the cases were malignant tumors. The common tumors in children were osteoblastoma, osteoid osteoma, chondrosarcoma and osteosarcoma. The common presenting symptom was pain (69.23%). The neurological symptom was 30.76%.

Discussion

By comparing the frequency of primary spinal tumors in the present study with those from the previous study of the Kelly et al[2], the Mayo Clinic[3] and Sundaresan et al[4]. The authors found the same groups of common tumors as giant cell tumor, hemangioma, chordoma, chondrosarcoma and Ewing sarcoma. Nevertheless, there were differences observed in the relative frequency of various tumors recorded in previous published reports and in our registry that was shown in Table1.

In the present study, the frequency of among the malignant tumors (65.88%) was same as previous report[2,3,5]. The most common primary malignant tumor of spine was chordoma (58.93%) that compared to previous reported from the Kelly et al (51.85%), and from and the series of the Mayo Clinic (11.88%). These findings might be influenced by the fact that the number of tumors in each series resulted in difference prevalence. The common sites of chordoma were the cranial and caudal ends[6,7]. In present study, all chordomas were found in sacrum. The prevalence of chordoma as a primary sacral tumor in this series was 61.9% (26/42) of tumors that affected sacrum. However, Bohlman et al[8] reported that 40% of chordoma constituted of malignant tumors in the cervical spine. McMaster et al[9] reported on 400 cases of chordoma over a 22 year period. Of these 131 occurred in the true vertebrae and 117 in the sacrum.

There was a slight female predilection for primary spinal tumors (52.95%) especially in malignant tumors. Chordoma, chondrosarcoma, giant cell tumor, osteosarcoma, eoisiophillic granuloma occurred more frequently in women than men that contrast with Chi et al that chordoma and chondrosarcoma were found more in male. Osteoblastoma and osteochondroma have a male predominance same as Chi et al report[10]. The racial predilection was found when compared with Kelly et al that studied the UK population (Table 2). The present study found no case of chondroma, epithelioid hemangioendothelioma, malignant giant cell tumor, fibrosarcoma and reticulosarcoma. However, Kelly's study found no report of malignant fibrous histiocytoma. Additionally, proportion of benign tumor is the same about 34%.

In present study, pain was found about 69% of the cases. Neurological involvement was 5.88% in benign lesions and 25% in malignant lesions. In contrast to Beer et al who reported the frequency of pain and neurological involvement accounted for 79% and 74% in their series[11].

These differences may be related to local patterns of practice and referral. Benign tumors are likely to be under-represented/under reported because some benign bone lesions such as hemangioma and osteoid osteoma are not frequently biopsied at our center. When diagnosis is straight forward as suggested by obvious benign radiological features, the inclination to perform a biopsy and report it may be under represented in the present series for that reason. This may be one reason why the malignant tumors occur at more than two times

Table 1. Demographic data of primary spine tumor

Type	Gender F:M	Age (year) X±SD	Age range	Tumor site					
				C	T	L	S	CoC	
Benign									
Hemangioma	3:5	41.75±20.82	14-74	1	5	2	0	0	8
Osteoblastoma	0:3	19.00±6.92	15-27	0	2	0	1	0	3
Osteochondroma	0:3	57.33±4.50	53-62	1	1	1	0	0	3
Osteoid osteoma	1:1	14.50±0.70	14-15	0	1	1	0	0	2
ABC	0:1	14	-	0	1	0	0	0	1
Langerhan histiocytosis	2:0	20±2.82	18-20	0	0	1	1	0	2
GCT	4:1	31.70±8.05	21-46	1	1	2	6	0	10
Malignant									
Chordoma	6:5	59±12.10	30-83	0	0	3	26		33
Chondrosarcoma	2:1	34±22.19	14-73	0	2	0	4	0	6
Osteosarcoma	5:1	39.83±29.28	15-94	0	1	2	2	1	6
Round cell sarcoma	2:3	48.20±16.99	27-73	0	1	4	0	0	5
Ewing sarcoma	0:4	15.67±11.59	5-28	1	1	1	1	0	4
MFH	1:1	56±4.24	53-59	1	5	2	0	0	2
Total benign (n = 29)				3 (10.34%)	11 (37.93%)	7 (24.14%)	8 (27.59%)	0	29
Total malignant (n = 56)				1 (1.79%)	6 (10.71%)	10 (17.86%)	34 (60.71%)	5 (8.93%)	56
Total (n = 85)				4 (4.70%)	17 (20%)	17 (20%)	42 (49.41%)	5 (5.89%)	85

C = cervical; T = thoracic; L = lumbar; S = sacrum; Coc = coccyx

Table 2. Comparison of frequencies of primary spine tumor: Present study, Kelly et al and Mayo clinic

Type	Frequency (%)		
	Present study (n = 85)	Kelly et al (n = 83)*	Mayo clinic series (n = 863)*
Prevalence	5.06%	4.6%	8.65 %
Benign	29/85 (34.12)	29/83 (34.93)	274/863 (31.75)
Hemangioma	8 (27.59)	2 (6.89)	40 (14.60)
Osteoblastoma	3 (10.35)	7 (24.14)	44 (16.05)
Osteochondroma	3 (10.35)	2 (6.89)	26 (9.49)
Osteoid osteoma	2 (6.89)	2 (6.89)	44 (16.05)
Aneurysmal bone cyst	1 (3.45)	6 (20.69)	0
Chondroma	0	1 (3.44)	6 (2.19)
Eosinophilic granuloma	2 (6.89)	1 (3.44)	0
Giant cell tumor (Osteoclastoma)	10 (34.48)	6 (10.68)	98 (35.77)
Epithelioid hemangioendothelioma	0	2 (6.89)	0
Malignant	56/85 (65.88)	54/83 (65.06)	589/863 (68.25)
Chordoma	33 (58.93)	28 (51.85)	70 (11.88)
Chondrosarcoma	6 (10.71)	4 (7.40)	109 (18.50)
Osteosarcoma	6 (10.71)	12 (22.22)	87 (14.77)
Round cell sarcoma	5 (8.93)	1 (1.85)	0
Malignant giant cell tumor	0	1 (1.85)	7 (1.19)
Ewing sarcoma	4 (7.14)	3 (1.85)	64 (10.87)
MFH	2 (3.57)	0	8 (1.36)
Fibrosarcoma	0	3 (5.55)	32 (5.43)
Reticulosarcoma	0	2 (3.70)	0

* exclude myeloma and lymphoma

the frequency as benign tumors. Additionally, our center is one of tertiary referral institutions in Bangkok. The primary spinal tumor patients may be referred to several centers that results in differences in the spectrum of bone tumors when compared to other institutions.

Conclusion

The present study was the first demographic study of primary spinal tumor in Thailand. It showed a variety of prevalences, when compared with similar studies, based on Western patients, whether the results reflected differences in the population, race or data collection method.

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Potential conflicts of interest

None.

References

1. Dreghorn CR, Newman RJ, Hardy GJ, Dickson RA. Primary tumors of the axial skeleton. Experience of the Leeds Regional Bone Tumor Registry. Spine (Phila Pa 1976) 1990; 15: 137-40.
2. Kelley SP, Ashford RU, Rao AS, Dickson RA. Primary bone tumours of the spine: a 42-year survey from the Leeds Regional Bone Tumour Registry. Eur Spine J 2007; 16: 405-9.
3. Unni KK. Dahlin's bone tumors, general aspects and data on 11,087 cases. 5th ed. Philadelphia: Lippincott-Raven; 1996.
4. Sundaresan N, Rosen G, Boriani S. Primary malignant tumors of the spine. Orthop Clin North Am 2009; 40: 21-36, v.
5. Benezech J, Fuentes JM. Primary tumors of the spine. A multicenter cooperative study. Neurochirurgie 1989; 35: 317-22.
6. Luck JV, Monsen DCG. Bone tumours and tumour

like lesions of vertebrae. In: Ruge D, Wiltse LL, editors. Spinal disorders: diagnosis and treatment. Philadelphia: Lea and Febiger;1970: 274-86.
7. Schajowicz F, Araujo EHS. Cysts and tumours of the musculo-skeletal system: pathology. In: Harris NH, editor. Postgraduate textbook of clinical orthopaedics. Briston: John Wright & Sons; 1983: 605-39.
8. Bohlman HH, Sachs BL, Carter JR, Riley L, Robinson RA. Primary neoplasms of the cervical spine. Diagnosis and treatment of twenty-three patients. J Bone Joint Surg Am 1986; 68: 483-94.
9. McMaster ML, Goldstein AM, Bromley CM, Ishibe N, Parry DM. Chordoma: incidence and survival patterns in the United States, 1973-1995. Cancer Causes Control 2001; 12: 1-11.
10. Chi JH, Bydon A, Hsieh P, Witham T, Wolinsky JP, Gokaslan ZL. Epidemiology and demographics for primary vertebral tumors. Neurosurg Clin N Am 2008; 19: 1-4.
11. Beer SJ, Menezes AH. Primary tumors of the spine in children. Natural history, management, and long-term follow-up. Spine (Phila Pa 1976) 1997; 22: 649-58.

การศึกษาความชุกของเนื้องอกปฐมภูมิของกระดูกสันหลังจากฐานข้อมูลเนื้องอกกระดูกโรงพยาบาลศิริราชย้อนหลัง 15 ปี

ศิริชัย วิลาศรัศมี, สรนาท เมืองสมบูรณ์, สุชาติ เบญจรัศมีโรจน์, ระพินทร์ พิมลศาสนต์, ชลเวช ชวศิริ, ปัญญา ลักษณะพฤกษา

วัตถุประสงค์: *เพื่อศึกษาความชุกข้อมูลทั่วไปและลักษณะอาการทางคลินิกของเนื้องอกปฐมภูมิของกระดูกสันหลัง*

วัสดุและวิธีการ: *ศึกษาย้อนหลังจากฐานข้อมูลเนื้องอกกระดูกศิริราชระหว่างปี พ.ศ. 2538 ถึงปี พ.ศ. 2553*

ผลการศึกษา: *มีเนื้องอกกระดูกสันหลังจำนวน 85 ราย ส่วนใหญ่เป็นหญิงร้อยละ 53 เนื้องอกปฐมภูมิชนิด benign ที่พบบ่อยที่สุดได้แก่ giant cell tumor และ hemangioma มะเร็งปฐมภูมิที่พบบ่อยที่สุดได้แก่ chordoma, chondrosarcoma และ osteosarcoma อายุเฉลี่ยที่มีอาการได้แก่ 44.68 ปีโดยอาการปวดพบมากที่สุดร้อยละ 73.53 ในกลุ่มมะเร็งปฐมภูมิและร้อยละ 52.94 ในผู้ป่วยเนื้องอก กลุ่มมะเร็งปฐมภูมิพบอาการทางระบบประสาทได้ร้อยละ 25 ตำแหน่งที่พบมะเร็งบ่อยที่สุดคือกระดูกกระเบนเหน็บ ในขณะที่ตำแหน่งที่พบเนื้องอกได้บ่อยที่สุดอยู่บริเวณกระดูกสันหลังส่วนอก*

สรุป: *การศึกษานี้เป็นการรายงานระบาดวิทยาของเนื้องอกปฐมภูมิกระดูกสันหลังในผู้ป่วยชาวไทยเป็นฉบับแรก โดยเมื่อเปรียบเทียบผลกับการศึกษาในลักษณะนี้ก่อนหน้านี้ซึ่งศึกษาในผู้ป่วยชาวตะวันตกพบว่ายังมีความชุกของเนื้องอกบางชนิดไม่ตรงกันอาจเกิดจากเชื้อชาติ รวมถึงวิธีการเก็บข้อมูล*