Results of Radiotherapy in Non Round Cell Spinal Metastasis

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Abstract

Spinal metastases are commonly encountered by physicians in a variety of clinical fields. There are some controversies in choice of treatment between surgery and radiotherapy. This report is a study of the outcomes of radiotherapy for metastatic nonround cell tumors of the spine. Medical records and films of 31 patients who were treated with radiotherapy at Songklanakarind Hospital were retrospectively reviewed. The most common primary tumors were prostate and breast. One patient had spinal metastases from malignant serous cystadenoma of the fallopian tube of which no previous report has been published. This patient had excellent results after radiotherapy. Back and neck pain were the primary symptoms of the patients, while motor or sensory deficits (or both) were found in 58 per cent of the cases. Seven patients had neurological recovery and 18 patients had pain relief after radiotherapy. Cause of compression is the only factor effecting the result from univariate and multivariate analysis. Spinal cord compressed by a tumor had a better recovery than those which were compressed by a bony fragment or intervertebral disc. The authors concluded that radiotherapy remains a good treatment for patient with non round cell spinal metastasis. Cause of spinal cord compression is the only factor predicting the result of treatment.

Key word : Radiotherapy, Spinal Metastasis

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The most common site of skeletal metastases is the spine[1-3]. Wong[4] reported that one in three patients who die from cancer have evidence of vertebral metastases. There is no consensus among physicians concerning the treatment of spinal metastases. The traditional surgical method, decompressive laminectomy, was disregarded because of the unsatisfactory results[1,5,6].

Currently, the results of surgical decompression through the anterior approach are more favorable and offer genuine improvement[5-7]. However, radiotherapy remains the most reasonable treatment option for many patients,[2,6,8-11] in particular patients who are too weak for major operative intervention[1]. Many reports of radiotherapy treatment alone for metastatic round cell tumors of the spine have been published, showing constantly good results[2,11,12]. The authors reported the results of radiotherapy alone in patients who had metastatic nonround cell tumors of the spine.

MATERIAL AND METHOD

Between April 1997 and September 2001, 45 patients with spinal metastatic tumor who were treated at Songklanakarind Hospital by radiotherapy were retrospectively reviewed. All patients had had tissue diagnosis indicating a malignant tumor not of round cell or central nervous system in origin. Fourteen patients were excluded because of insufficient follow-up of clinical data in 9, while 5 patients were combined with surgical treatment. All remaining 31 patients' charts and films who were treated by radiation alone were reviewed as follows: demographic data, signs and symptoms, type of tumors, plain film and MRI finding, levels of metastases and complications. Total 30 Gy given in 10 divided doses, patients received dexamethasone 4 mg every 6 hours until radiation therapy was completed. All breast cancer patients had received chemotherapy, the most recent one 18 months previously. MRI records of all patients were reviewed to discover the cause of spinal compression, which could be classified as tumoral or structural. Structural causes were wedging or dislocation of the spinal body, presence of bony fragments, or herniated intervertebral discs within the spinal canal leading to direct compression of the spinal cord. Tumoral causes of compression were tumors within the intraspinal canal (Fig. 1).

The neurological deficits were evaluated at the first visit of follow-up. All of them came to follow-up at the first visit (4 weeks after radiotherapy) The neurological status were graded according to Frankel [13] as follows:

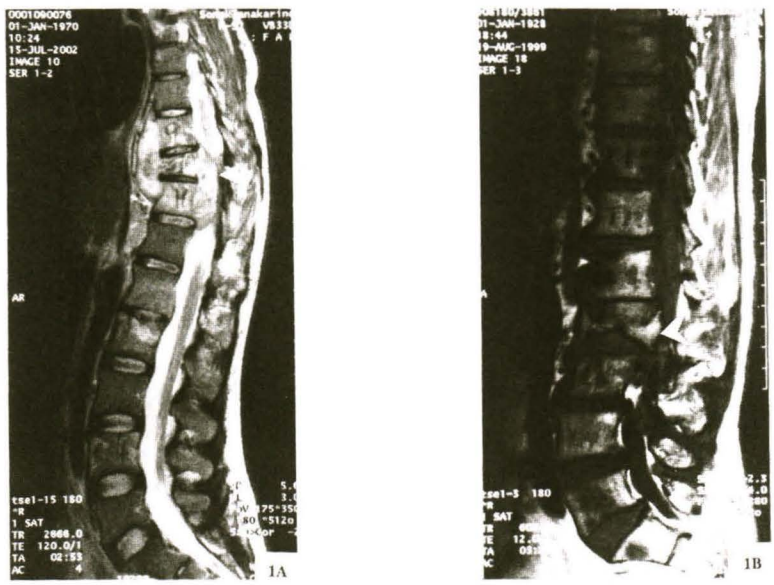

Fig. 1. MRI of patients shows the causes of spinal cord compression, A) tumoral cause, B) structural cause from bony fragment.

1. Frankel A 'Complete' This means that the lesion was found to be complete both motor and sensory below the segmental level marked.

2. Frankel B 'Sensory only' This implies that there was some sensation present below that level.

3. Frankel C 'Motor useless' This implies that there was some motor power present below the lesion but it was of no practical use to the patient.

4. Frankel D 'Motor useful' This implies that there was useful motor power below the level of the lesion. Patients in this group could move the lower limbs and many could walk, with or without aids.

5. Frankel E 'Recovery' This implies that the patient was free of neurological symptoms, i.e. no weakness, no sensory loss, no sphincter disturbance. Abnormal reflexes may have been present.

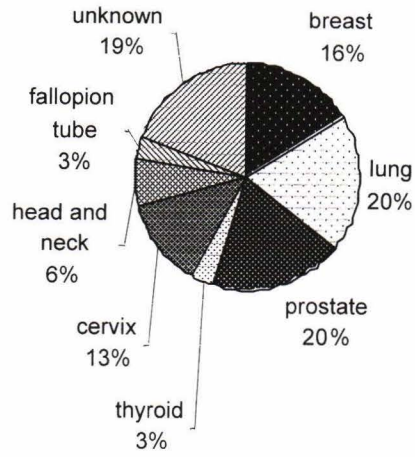

Fig. 2. Primary site of tumor in 31 patients with spinal metastases.

Statistical analysis

All descriptive statistics were calculated. Univariate analysis was test for crude association among factors effecting the result of treatment. Multiple logistic regression analysis was evaluated for independents variable from potential significant factor from univariate analysis.

RESULTS

Among 31 patients who were reviewed, 19 (61%) were male and 12 (39%) were female. The patient's ages ranged from 38 to 87 years (mean 57.2 years). Twenty four of 31 (77%) patients had a known underlying malignant tumor, while the primary tumor could not be found in the remainder. Primary tumors of all patients are shown in Fig. 2. The common primary tumors were lung, prostate, breast and unknown origin. The most common clinical symptom was progressive back or neck pain (100%) and most of them (71%) suffered from night pain. Twenty patients (65%) had neurological deficit at the first examination and the duration of neurological deficit ranged from 4 to 60 days (mean 27.0 days). The most common sites of metastases were T9 and T12. Sixteen patients (52%) had multiple sites of metastases while fifteen patients (48%) had single site metastases. According to the cause of compression, seventeen cases were classified as tumoral compression and fourteen cases were classified as structural. Neurological recovery was achieved in 7 patients (23%). Two cases recovered

Table 1. Relationship of Frankel's grade of patients before and after receiving radiotherapy.

Frankel grade after radiotherapy	Frankel grade before radiotherapy A	B	C	D	E
A	3				
B		2			
C			1		
D			2	7	
E		1	2	2	11

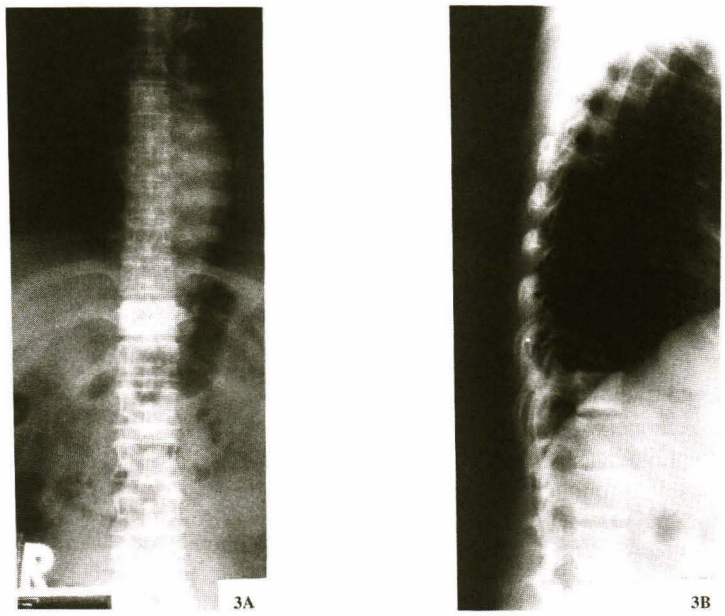

Fig. 3. Antero-posterior, A) and lateral roentgenograms, B) demonstrates blastic spinal metastases of malignant serous cystadenoma of fallopian tube at T11. Patient had complete neurological recovery after radiotherapy.

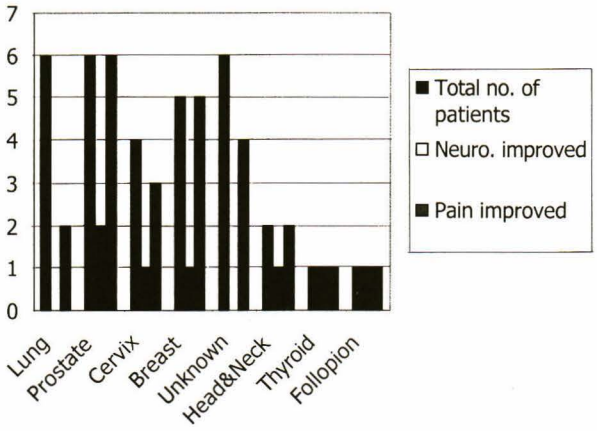

Fig. 4. Results of radiotherapy correlated to nature of primary tumors in terms of pain and neurological improvement.

from Frankel C to Frankel E, two cases from Frankel D to Frankel E, two cases from Frankel C to Frankel D and one case from Frankel B to Frankel E (Table 1). Six of these seven patients (86%) were classified as tumoral compression. One patient with malignant serous cystadenoma of the fallopian tube had full neurological recovery from Frankel C to Frankel E (Fig. 3). Pain improved in 24 patients (77%) after radiotherapy, most of them (16 patients) were in the tumoral group. Pain worsened in two cases in the structural group while did not occur in the tumoral group. The responses to radiotherapy were different in each type of primary tumor. Lung cancer patients were the least responsive in both pain and neurological improvement. Four of six patients who had unknown primary cancer had pain relief after radiotherapy but none improved their neurological deficit. Excluding lung and unknown primary cancer patients, almost all others, (18 of 19 patients) had pain relief and some of them had improved neurological deficit (Fig. 4). There was no major complication from radiotherapy in any patients. The most common complication was urinary tract infection, 5 cases (16%). There was no death at the first follow-up. Ten patients (32%) had concomitant bone metastases, with the most common site being the pelvic bone, (6 of 10 patients).

From both univariate and multivariate analysis for factor effecting the result of radiotherapy, the only factor, cause of compression was significantly associated with both neurological and pain improvement (Table 2, 3).

Table 2. Univariate analysis of factors effecting outcome of radiotherapy for non round cell spinal metastases.

Factor	Pain Improvement		Neurological improvement	
	Chi-square	P-value	Chi-square	P-value
Gender	0.67	0.53	0.06	0.79
History of malignancy	6.17	0.06*	0.18	0.67
Type of primary malignancy	9.54	0.09	0.98	0.80
Night pain	1.12	0.89	17.42	0.002*
Frankel's grade	3.15	0.37	3.48	0.06*
Cause of compression	6.00	0.01*	10.21	0.07*
Level of pain	5.11	0.16	1.01	0.79
Level of involvement	4.65	0.19	0.80	0.84

* Included for multivariate analysis

Table 3. Multivariate analysis using logistic regression analysis for the result of radiotherapy.

Factor	Odds Ratio	P-value	95% confident interval
Neurologic Improvement			
Night pain	1.39	0.24	0.09-20.99
Cause of compression	0.04	0.02*	0.00-0.58
Frankel grade	0.23	0.53	0.02-21.88
Pain Improvement			
History of malignancy	13.08	0.07	0.94-152.96
Cause of compression	0.06	0.04*	0.00-0.89

* Statistically significant.

DISCUSSION

Patients who have malignant disease and suffer from back or neck pain should be carefully examined for spinal metastases[2,14] because early detection is important. Patients who have spinal metastases without vertebral collapse and do not have neurological impairment are good candidates for radiotherapy[7,15,16]. In the authors' review, three patients who had completed neurological deficit did not recover after radiation. Several reports have suggested that most patients who can ambulate rarely lost their ability after radiation[2,6,10,11].

The nature of primary tumors, as also found in previous reports, was an important factor influencing the neurological outcome. Patients with prostate, breast metastases often have good outcome after radiotherapy[9,12,17], while patients whose primary tumor with the lung or unknown were resistant to radiation had a poor outcome[3,18,19]. Regarding the spinal metastases of cervical cancer, Ratanatharathorn[20] reported three of six patients experienced pain relief and neurological improvement after treatment with radiotherapy. Leung[21] reported three of six patients who had spinal metastases of head and neck cancer improved their neurological deficit after radiation. Because of the limited number of cases, the efficacy of treatments can not be compared.

One patient who had spinal metastases of malignant serous cystadenoma of the fallopian tube had an excellent outcome after radiotherapy. This is the first case report in Thailand of this type of spinal metastasis.

The nature of the block was another important factor. Most patients who had a complete block by tumoral causes responded well to radiotherapy in both pain relief and neurological recovery. However, some of the structural cause also responded well in terms of pain relief, except those with unknown primary tumor. This response may be explained by the reduction of pressure in the spinal canal due to the prompt shrinkage of the tumor after radiation or the effect of dexamethasone[11,22,23].

The present study has some limitations such as no available data regarding the onset of neuro-

logical deficit which has been proposed to be an important factor for neurological recovery[1,2,11].

In summary, the authors suggest that radiotherapy in nonround cell metastases tumors of the spine remains a good treatment. However, patient selection is important for the results of treatment. Cause of spinal compression should be evaluated, which can predict the result of the treatment.

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ผลของการรักษามะเร็งชนิด Non round Cell ที่แพร่กระจายไปยังกระดูกสันหลังด้วยการฉายรังสี

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มะเร็งแพร่กระจายไปที่กระดูกสันหลังเป็นปัญหาที่พบได้บ่อย และสร้างความทุกข์ทรมานให้แก่ผู้ป่วย รวมถึงผู้ดูแลเป็นอันมาก การเลือกวิธีการรักษาในปัจจุบันยังมีข้อโต้แย้งระหว่างการรักษาด้วยการผ่าตัดหรือวิธีไม่ผ่าตัด โดยเฉพาะในผู้ป่วย Non round cell tumors รายงานฉบับนี้แสดงผลการรักษาผู้ป่วยที่เข้ารับการรักษาด้วยการฉายรังสีที่โรงพยาบาลสงขลานครินทร์ ตั้งแต่ปี 2540–2544 จำนวน 31 ราย พบมะเร็งที่แพร่กระจายไปที่กระดูกสันหลังบ่อยเรียงตามลำดับดังนี้คือ มะเร็งต่อมลูกหมาก และมะเร็งเต้านม พบผู้ป่วยหนึ่งรายเป็นมะเร็งปฐมภูมิจากปีกมดลูก ซึ่งยังไม่เคยมีการรายงาน อาการสำคัญของผู้ป่วยที่มาพบแพทย์คือ ปวดหลังและปวดคอ ผลของการรักษาด้วยการฉายรังสีพบว่า ผู้ป่วย 7 รายมีการฟื้นตัวของระบบประสาท ผู้ป่วย 18 รายอาการปวดดีขึ้น ปัจจัยสำคัญที่มีผลต่อการตอบสนองต่อการรักษาได้แก่ สาเหตุการกดทับไขประสาท พบว่าถ้าการกดทับเกิดจากเนื้องอกจะให้ผลตอบสนองทั้งในด้านการบรรเทาปวด (pain relief) และการฟื้นตัวของระบบประสาท (neurological improvement) ดีกว่าสาเหตุที่เกิดจากการกดทับของกระดูกหรือหมอนรองกระดูกอย่างมีนัยสำคัญทางสถิติ โดยสรุปการรักษาผู้ป่วยมะเร็งที่แพร่กระจายไปกระดูกสันหลังด้วยการฉายรังสีเป็นทางเลือกที่ดีทางเลือกหนึ่ง สาเหตุการกดทับไขประสาทเป็นปัจจัยที่บ่งชี้ถึงความสัมฤทธิ์ผลของการรักษาด้วยการฉายรังสี

คำสำคัญ : การฉายรังสี, มะเร็งแพร่กระจายไปยังกระดูกสันหลัง

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