Does Magnetic Resonance Imaging Give Value-Added than Bone Scintigraphy in the Detection of Vertebral Metastasis?

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Objective: *To determine the role of Magnetic Resonance (MR) imaging for the investigation of patients with suspected metastasis to the spine by bone scintigraphy.*
Material and Method: *Retrospectively reviewed with comparison was made between Technetium-99m Methylene Diphosphonate (99^{m}Tc-MDP) bone scintigraphy and corresponding spine MR images in 48 cases of vertebral metastasis at Siriraj Hospital. The intervals between bone scintigraphy and MR images did not exceed 1 month. The authors studied between January 2005 and December 2006. Bone scintigraphy were performed with planar imaging of the entire body and MR imaging was performed with the 1.5 tesla and 3.0 tesla scanner using standard techniques with T1-, T2-weighted images and fat-suppressed T1-weighted images with intravenous administration of gadopentetate dimeglumine. The MR imaging findings were studied: location (cervical or thoracic or lumbar or sacrum spine), number of lesions (solitary or multiple lesions), pattern of enhancement (homogeneous or inhomogeneous), involvement of spinal canal, compression of spinal cord, extradural extension, other incidental findings such as pulmonary metastasis, pleural effusion, lymphadenopathy. The final diagnosis was confirmed clinically and followed-up for further management (radiation or surgery) or followed-up by MR imaging (1 month-16 months) and bone scintigraphy (5 months-12 months).*
Results: *Forty-eight cases (80 lesions) of vertebral metastasis were identified (25 men and 23 women; mean age 61 years and range 8-84 years). Primary neoplasms include breast cancer (n = 11), colorectal cancer (n = 7), lung cancer (n = 6), prostate cancer (n = 5), nasopharyngeal cancer (n = 5), head and neck cancer (n = 3), thyroid cancer (n = 2), liver cancer (n = 2), esophagus cancer (n = 1), bladder cancer (n = 1), retroperitoneum cancer (n = 1), medulloblastoma (n = 1), cervical cancer (n = 1), ovarian cancer (n = 1), malignant melanoma (n = 1). The result of bone scintigraphy and MR imaging is used to evaluate vertebral metastasis: in 44 lesions of bone scintigraphy positive for vertebral metastasis, 40/44 lesions (91%) which MR imaging reveal vertebral metastasis. This group may not benefit for further investigation by MR imaging.*

In 24 lesions of negative of bone scintigraphy for vertebral metastasis, the authors found that 14/24 lesions (58%) showed positive of vertebral metastasis from MR imaging. In this group, the authors recommended a further investigation because 58% of negative bone scintigraphy lesions are depicted by only MR imaging.

MR imaging demonstrated metastatic cord compression in 16 cases. Extradural extension causes spinal canal narrowing in 30 cases.
Conclusion: *The authors conclude that the MR imaging is more efficient than the bone scintigraphy in detecting vertebral metastasis, especially in the cases that bone scintigraphy are equivocal or negative for vertebral metastasis in high clinical suspicion. Furthermore, MR imaging is important for the further treatment planning such as radiation therapy or systemic chemotherapy. Although MR imaging is useful in the detection of early metastasis that are localized completely in the bone marrow cavity, routinely bone scintigraphy remains that most cost-effective method for examination of the entire skeleton.*

Keywords: *Bone neoplasms, Lumbar vertebrae, Magnetic resonance imaging, Neoplasm metastasis, Radionuclide imaging, Spinal neoplasms*

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Bone metastasis is the most common malignant bone tumor seen in adults. The prevalence of bone metastasis in patients with known primary cancer is about 70% of patients with metastasis[1,2]. Bone metastasis may occur with almost all malignancies, but they are most common in carcinomas of the breast (47-85%), lung (32%), prostate (54-85%), kidney (33-40%) or thyroid (28-60%)[2,3]. The spine is the most common site of skeletal metastasis (39%) because of the abundant vascularization and red bone marrow[4-6]. In additional, metastatic disease may remain confined to the skeleton with the decline in quality of life and eventual death almost entirely due to skeletal complications and their treatment. The prognosis of metastatic bone disease depends on the primary site, with breast and prostate cancers associated with a survival measured in years compare to lung cancer, where the average survival is only a matter of months. Imaging of spinal metastasis disease is important in the management of patients with malignant disease since the detection of metastases is significant in the extent of treatment and prevention of spinal cord compression. In early 1970s, technetium-99m methylene diphosphonate (MDP) bone scintigraphy has been the method of choice for establishing the presence of skeletal metastases[7,8], as well as the staging of patients with cancer. Radionuclide bone scintigraphy employing 99mTc-labeled phosphates are known to be more sensitive than plain radiographs in the detection of bone metastases. More than 50% of the bone mineral content must be lost before metastasis is evident on a plain radiography[9,10] and cells growing in the marrow rather than the cortex reduce the likelihood of radiographic detection[11]. However, bone scintigraphy can be false-negative findings, especially in the cases of very aggressive metastases. In cases of false-positive findings non-malignant diseases such as degenerative disease, healing fracture, various metabolic disorders and their complication (*e.g.* osteoporosis and osteomalacia), have been described[12-15]. Additional imaging with conventional roentgenograms, computed tomography (when bone scintigraphy findings are inconclusive) and MR imaging may be the technique of choice for noninvasive evaluation of bone marrow and its potential in detection of bone metastases is considered to be very good[16,17].

The purpose of the present study was to determine the role of MR imaging to that of the bone scintigraphy in the work-up of patients with suspected metastases to the spine.

Material and Method

A retrospective study was performed by including ones who were diagnosed primary tumor origin (January 2005-December 2006), there were totally 92 patients in the study.

There were 44 patients excluded from the present study (no history of malignancy 7 patients, history of primary vertebral malignancy and hematological malignancy 10 patients, examination of Magnetic Resonance (MR) imaging before bone scintigraphy 4 patients, examination of bone scintigraphy before MR imaging more than 1 month 20 patients, examination of MR imaging of spine without gadolinium administration 3 patients).

Finally, there were forty-eight patients (25 men and 23 women), aged range 8-84 years (mean age 61 years) who had a history of other primary malignancy. All patients were included if bone scintigraphy and MR imaging of the requested vertebral region were performed within 1 month of each other and were available for review. Primary neoplasms included breast cancer (n = 11), colorectal cancer (n = 7), lung cancer (n = 6), prostate cancer (n = 5), nasopharyngeal cancer (n = 5), head and neck cancer (n = 3), thyroid cancer (n = 2), liver cancer (n = 2), esophagus cancer (n = 1), bladder cancer (n = 1), retroperitoneum cancer (n = 1), medulloblastoma (n = 1), cervical cancer (n = 1), ovarian cancer (n = 1), malignant melanoma (n = 1).

Bone scintigraphy was performed 3 hours after intravenous administration of 20 mCi (740 MBq) of Technetium-99m Methylene Diphosphonate (99^{m}Tc-MDP) with use of a SPECT (Dual head; GE Healthcare Technologies). Bone scintigraphy was reviewed by one nuclear medicine physician who was blinded to clinical and MR imaging findings. Areas with increased accumulation of 99^{m}Tc-MDP, as well as areas with decreased accumulation, were considered to represent metastases.

MR imaging of spine was performed on a 1.5-Tesla (T) imager (ACS, Phillips). The acquisition matrix was 256 X 256 with field of view of 220 mm for axial plane and 360 mm for sagittal plane. The intersection gap was 0.3-0.4 mm and section thickness 3-4 mm. Routine scans consists of T1-weighted sagittal view (TE range 12-15 ms, TR range 400-650 ms), T2-weighted sagittal and axial views (TE range 80-120, TR range 2,000-2,800). In addition, axial and sagittal fat-suppressed T1-weighted images (TE range 12-15 ms, TR range 400-650 ms) were obtained after intravenous administration of 0.1mmol/kg gadopentetate

dimeglumine. Images were obtained from the MR 1.5T (ACS, Phillips) in studying of cervical, thoracic, lumbar and sacrum spines in 9 patients (n = 9).

MR imaging of spine was performed on a 1.5-T imager (Intera, Phillips). The acquisition matrix was 256 x 256 with field of view of 160 mm for axial plane and 360 mm for sagittal plane. The intersection gap was 0.3-0.4 mm and section thickness 3-4 mm. Routine scans consists of T1-weighted images on sagittal view (TE range 10-15 ms, TR range 400-450 ms), T2-weighted images on both sagittal and axial views (TE range 80-120, TR range 2,000-2,500). In addition, axial and sagittal fat-suppressed T1-weighted images (TE range 10-15 ms, TR range 400-450 ms) were obtained after intravenous administration of 0.1 mmol/kg gadopentetate dimeglumine. Images were obtained from the MR 1.5-T imager (Intera, Phillips) in studying of the cervical, thoracic, lumbar and sacrum spines in 29 patients (n = 29).

MR imaging of spine was performed on a 3.0-Tesla (T) imager (Achieva, Phillips). The acquisition matrix was 512 x 512 with field of view of 160 mm for axial plane and 300 mm for sagittal plane. The intersection gap was 0.3 mm and section thickness 3 mm. Routine scans consist of T1-weighted images on sagittal view (TE range 8-20 ms, TR range 500-800 ms), T2-weighted images on both sagittal and axial views (TE range 80-120 ms, TR range 2,000-4,000 ms). In addition, axial and sagittal fat-suppressed T1-weighted images (TE range 8-20 ms, TR range 500-800 ms) were obtained after intravenous administration of 0.1 mmol/kg gadopentetate dimeglumine. Images were obtained by 3.0 T (Achieva, Philips) in studying of the cervical, thoracic, lumbar and sacrum spine are in 10 patients (n = 10). All MR imaging were reviewed separately by two neuroradiologists who were blinded to clinical and bone scintigraphy findings. The discrepancies were resolved by the consensus.

Signal intensities of bone marrow lesions were related to that of normal bone marrow. On T1-weight images, focal or diffuse areas of low signal intensity in the vertebral bodies were considered to represent vertebral metastases. On T2-weight images, areas of high and low signal intensity were considered to be metastases. On fat-suppressed T1-weighted with gadopentetate dimeglumine administration images, areas of enhancement were considered to be metastases. MR imaging findings suggestive of metastatic compression fractures were as follows: a convex posterior border of the vertebral body, abnormal signal intensity of the pedicle or posterior element, an epidural mass, an encasing epidural mass, a focal paraspinal mass, and other spinal metastases.

Changes in signal intensity in the bone marrow in conjunction with degenerative changes of the adjacent intervertebral disk were considered to be benign and were distinguished from metastases. MR imaging findings were suggestive of acute osteoporotic compression fractures were as follows: a low-signal-intensity band on T1- and T2-weighted images, spared normal bone marrow signal intensity of the vertebral body, retropulsion of a posterior bone fragment, and multiple compression fractures.

MR imaging were interpreted with respect to location (cervical or thoracic or lumbar or sacrum spine), number of lesions (solitary or multiple lesions), pattern of enhancement (homogeneous or inhomogeneous). MR imaging were also interpreted an involvement of spinal canal, compression of spinal cord, extradural extension.

Other incidental findings such as pulmonary metastasis, pleural effusion, lymphadenopathy were also identified.

The result of the interpretations was entered in a database and evaluated for an agreement using the kappa statistics. Then the result was interpreted as follows; < 0.4 = poor agreement, 0.40-0.75 = fair to good agreement, > 0.75 = excellent agreement. Discrepancies were resolved by the consensus. Chi-Square Tests were used to interpretation at significance level of 0.05.

Results

The present study showed 48 patients (80 lesions) of vertebral metastasis. The most common presenting symptom was low back pain.

All patients were included if bone scintigraphy and Magnetic Resonance (MR) imaging spine studies of the same area were performed within 1 month of each other and were available for review. The results of bone scintigraphy and MR imaging to evaluate vertebral metastases (Table 1).

Table 1. The result of bone scintigraphy and MR imaging in evaluation of vertebral metastasis

Bone scintigraphy	MR imaging	
	Metastasis	No metastasis
Metastasis	40 lesions	4 lesions
No metastasis	14 lesions	10 lesions
Equivocal	6 lesions	6 lesions

Bone scintigraphys was positive in 44/80 (55%) and negative in 24/80 (30%). Bone scintigraphys were considered as equivocal as vertebral metastases in 12/80 (15%). In group of positive bone scintigraphy in 44/80 (55%), MR imaging appeared positive for vertebral metastases in 40/44 (91%) and negative in 4/44 (9%). Grouping of positive of both bone scintigraphy and MR imaging for vertebral metastasis, the authors found that lesions confined at cervical 5 lesions, thoracic 17 lesions, lumbar 13 lesions and sacrum 5 lesions. The primary tumor had breast cancer (n = 7), prostate cancer (n = 4) (Fig. 7), nasopharyngeal cancer (n = 4), lung cancer (n = 3), thyroid cancer (n = 2), liver cancer (n = 2), colon cancer (n = 2), cervical cancer (n = 1) and bladder cancer (n = 1). Group of positive bone scintigraphy and negative of MR imaging in 4/44 (9%), the authors found that lesions confined at cervical 1 lesion and lumbar 3 lesions. The primary tumor had breast cancer (n = 2), head and neck cancer (n = 1) (Fig. 1) and colon cancer (n = 1). The authors found patients (breast cancer and head and neck cancer) had no radiation therapy of the spine (n = 3). Then the follow-up MR imaging was performed for 3 months and showed no significant change. In addition, colon cancer (n = 1), the patient was lost in follow-up.

In a group of negative bone scintigraphy in 24/80 (30%), MR imaging appeared positive for

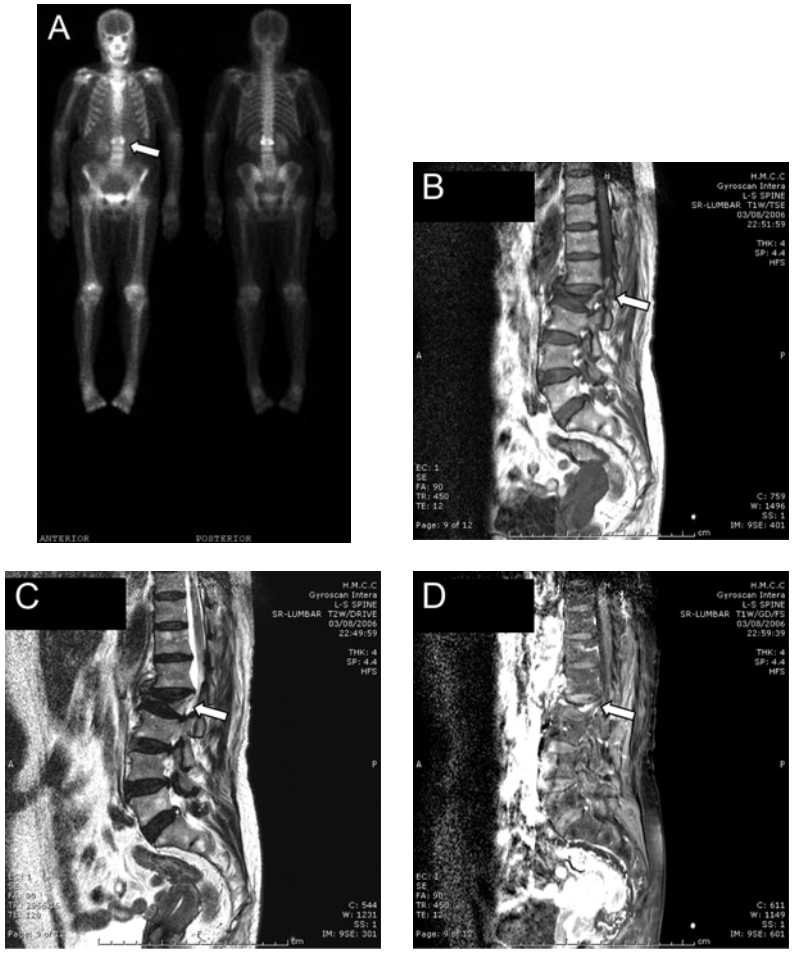

Fig. 1 A case of buccal mucosa cancer, presented with low back pain. (A) Bone scintigraphy showed increased radiotracer uptake at L1-L2 vertebrae (white arrow), highly suspected bone metastases. (B,C,D) MR imaging revealed low signal intensity on intervertebral disc on T2W at L1-L2, L2-L3, L3-L4, L4-L5 and L5-S1 with compression fracture of L2 vertebra (white arrow), due to severe degenerative change

vertebral metastases in 14/24 (58%) and negative in 10/24 (41%). Group of negative of bone scintigraphy and positive of MR imaging (14 lesions in 11 cases), the authors found that lesions were confined at cervical 3 lesions, thoracic 4 lesions, lumbar 4 lesions and sacrum 3 lesions. The primary tumor had breast cancer (n = 4), lung cancer (n = 2), colon cancer (n = 2) (Fig. 2) and nasopharyngeal cancer (n = 1), liver cancer (n = 1) and bladder cancer (n=1). Breast cancer (n=1) showed the patient had thoracic and lumbar metastases and received radiation therapy with improved clinical. In lung cancer (n = 1) showed the patient had cervical, lumbar and sacrum lesions and then radiation therapy with improved clinical. In the group of negative of bone scintigraphy and MR imaging (10 lesions in 8 cases), the primary tumor was colon cancer (n = 2), head and neck cancer (n = 2), medulloblastoma (n = 1), thyroid cancer (n = 1), lung cancer (n = 1), malignant melanoma (n = 1). In these cases, the authors found 6 cases had follow-up bone scintigraphy and MR imaging in 3-6 months shows no vertebral metastasis. And another 2 cases were lost in follow-up, due to relocation.

Twelve lesions (12/80, 15%) were equivocal for metastasis in bone scintigraphy. Then, MR imaging appeared positive for vertebral metastases in 6/12 (50%) and negative in 6/12 (50%). A group of no vertebral

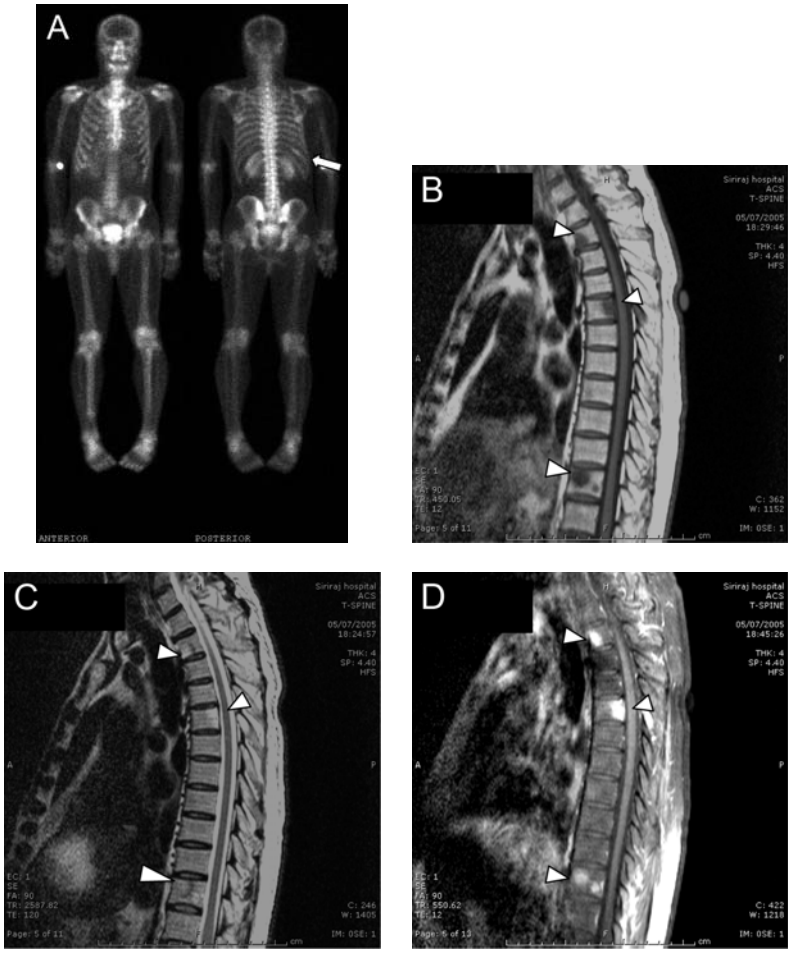

Fig. 2 A case of colon cancer, post surgery, presented back pain. (A) Bone scintigraphy showed increased radiotracer uptake at posterior right 10th rib (white arrow), possibly bony metastasis. (B,C,D) MR imaging appeared low signal intensity on T1W, high signal intensity of lesions on T2W and enhanced gadolinium at T2, T5 and T11 vertebrae (arrow head). All these findings are compatible with vertebral metastases. He was sent to radiation therapy and follow up clinical improved

metastases from MR imaging study had 6 lesions in 6 cases, including pyriform cancer (n = 2) (Fig. 8), nasopharyngeal cancer (n = 1), esophagus cancer (n = 1) (Fig. 6), breast cancer (n = 1) (Fig. 3) and lung cancer (n = 1). Three patients (pyriform cancer 2 cases and esophagus 1 case) had no radiation therapy of vertebra and bone scintigraphy follow-up next 3-6 months showed no significant change of lesions. The group of vertebral metastases from MR imaging study had 6 lesions in 6 cases included primary tumor of lung cancer (n = 2) (Fig. 4), nasopharyngeal cancer (n = 1), breast cancer (n = 1) (Fig. 5), ovary cancer (n = 1) and squamous cell carcinoma of retroperitoneum (n = 1). Three patients (lung cancer 2 cases and nasopharyngeal cancer 1 case) were received radiation therapy and clinically improved (reduced pain from site of vertebral metastases) when follow-up. One patient (squamous cell carcinoma from retroperitoneum origin with spinal cord compression) had surgery 1 case. One patient (breast cancer) died from distant metastasis (liver metastasis). One patient lost follow-up therapy, due to relocation.

A group of bone scintigraphy and MR imaging detected vertebral metastases. In this study, we found

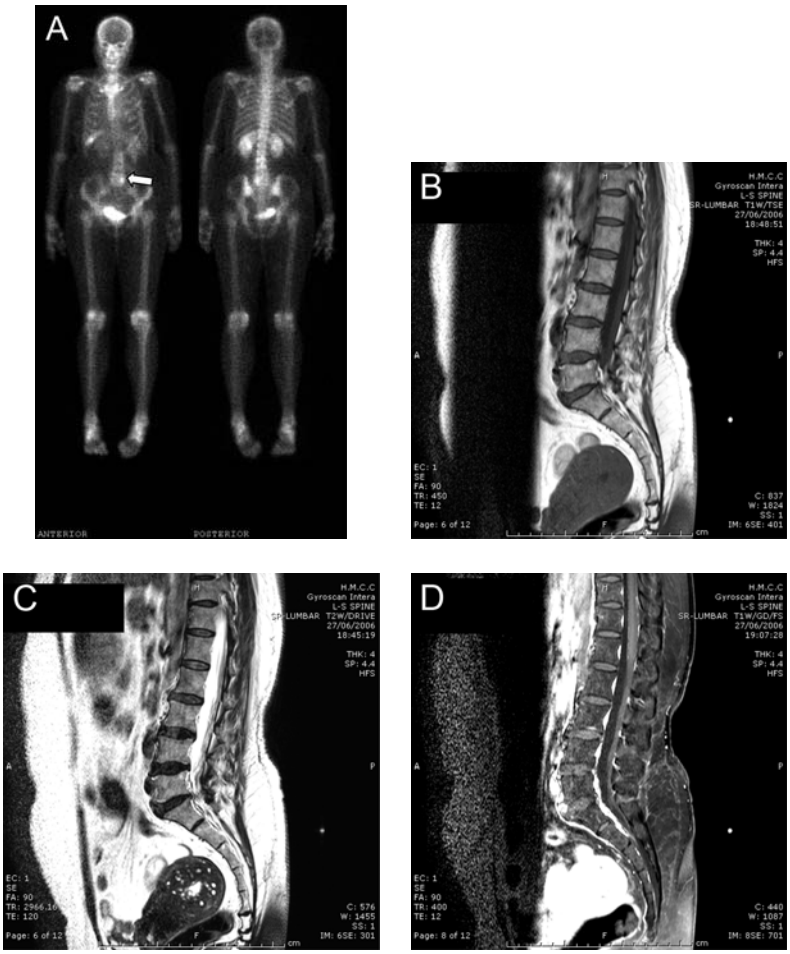

Fig. 3 A case of breast cancer and post mastectomy. (A) Bone scintigraphy revealed increased radiotracer uptake at L5 vertebra (white arrow), bony metastasis cannot be excluded. (B,C,D) MR imaging showed low signal intensity on T2W at intervertebral disc of L3-L4, L4-L5 and L5-S1, compatible with degenerative change. No abnormal signal intensity in vertebral body on T1W and T2W is detected. After gadolinium administration showed no enhancement. (C) MR imaging findings also revealed enlarged uterus with multiple small cysts in the myometrium cavity (arrow head), possibly adenomyosis

that MR imaging detected more lesions than bone scintigraphy in 16 lesions (13 cases). These cases confined at thoracic 11 lesions, lumbar 4 lesions and cervical spine 1 lesion. Primary tumor were lung cancer (n = 3), prostate cancer (n = 3), liver cancer (n = 2), colon cancer 1 cases, breast cancer (n = 1), nasopharyngeal cancer (n = 1), bladder cancer (n = 1), thyroid cancer (n = 1).

Other findings from MR imaging study, the authors found cord compression 16 lesions (16 cases) and extradural extension causing spinal canal narrowing in 35 lesions (30 cases).

Furthermore, MR imaging findings also showed left thyroid mass (n = 1), pulmonary metastases (n = 2), lung collapse (n = 1), paravertebral soft tissue mass and lymphadenopathy (n = 8), pleural effusion (n = 1), tumor infiltration of dural canal (n = 1), hepatocellular carcinoma (n = 1), vertebral hemangioma (n = 3).

The agreement between the 2 neuroradiologists in diagnostic vertebral metastases was evaluated using a weighted kappa analysis. A kappa value was 0.864 (excellent agreement). Chi-Square Tests was used to interpretation (= 0.00850).

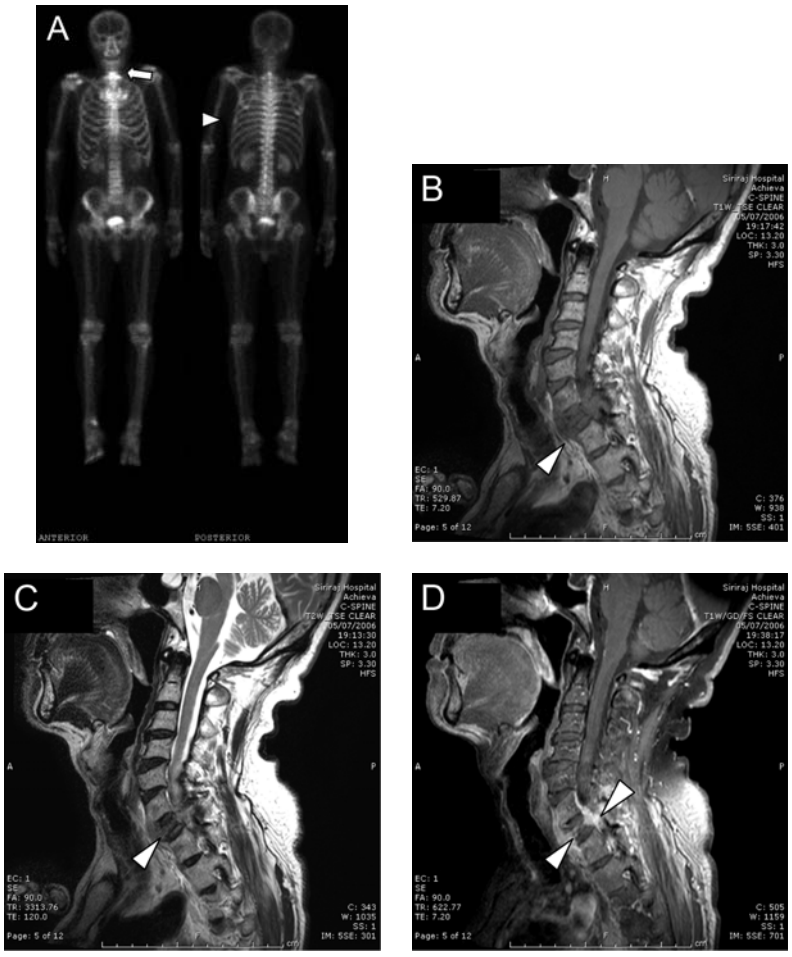

Fig. 4 A 74 years-old male with known case of lung cancer, presented with neck pain. (A) Bone scintigraphy on 04/07/2006 revealed increased radiotracer uptake at C7 vertebra (white arrow) and left 7th rib (arrow head) which bony metastasis cannot be excluded. (B,C,D) MR imaging on 05/07/2006 showed low signal intensity on T1W and T2W with compression fracture of C7 vertebra (arrow head). After gadolinium administration appeared increased enhancement. All findings were compatible with vertebral metastasis. He was sent for radiation therapy. Follow-up showed clinical improvement (decreased neck pain)

The interobserver agreement (kappa-value) for spinal cord compression was 0.959, extradural extension and spinal canal narrowing was 0.972.

Discussion

Bone scintigraphy has become the method of choice for early detection of metastases and staging of patient with cancer. This is because bone scintigraphy allows an imaging of the entire skeleton in one study. When the bone scintigraphy reveals multiple areas of increased radiotracer uptake then metastatic disease is very likely, although benign causes such as multiple Looser's zones cannot be completely excluded. The bone scintigraphy, with few lesions, particularly a solitary abnormality, is more diffucult to interpret. It has been shown that 55% of solitary scan abnormality at any site was due to metastatic disease[5,18]. Another study[19] showed a solitary isotope bone scintigraphy abnormality in the spine was due to metastases in 29% of patients studied. Since a bone scintigraphy diagnosis is problematical in the patients with known malignancy, further investigations are indicated. Plain radiograph is an insensitive test for metastases as more than 50% of bone must be destroyed before a lesion

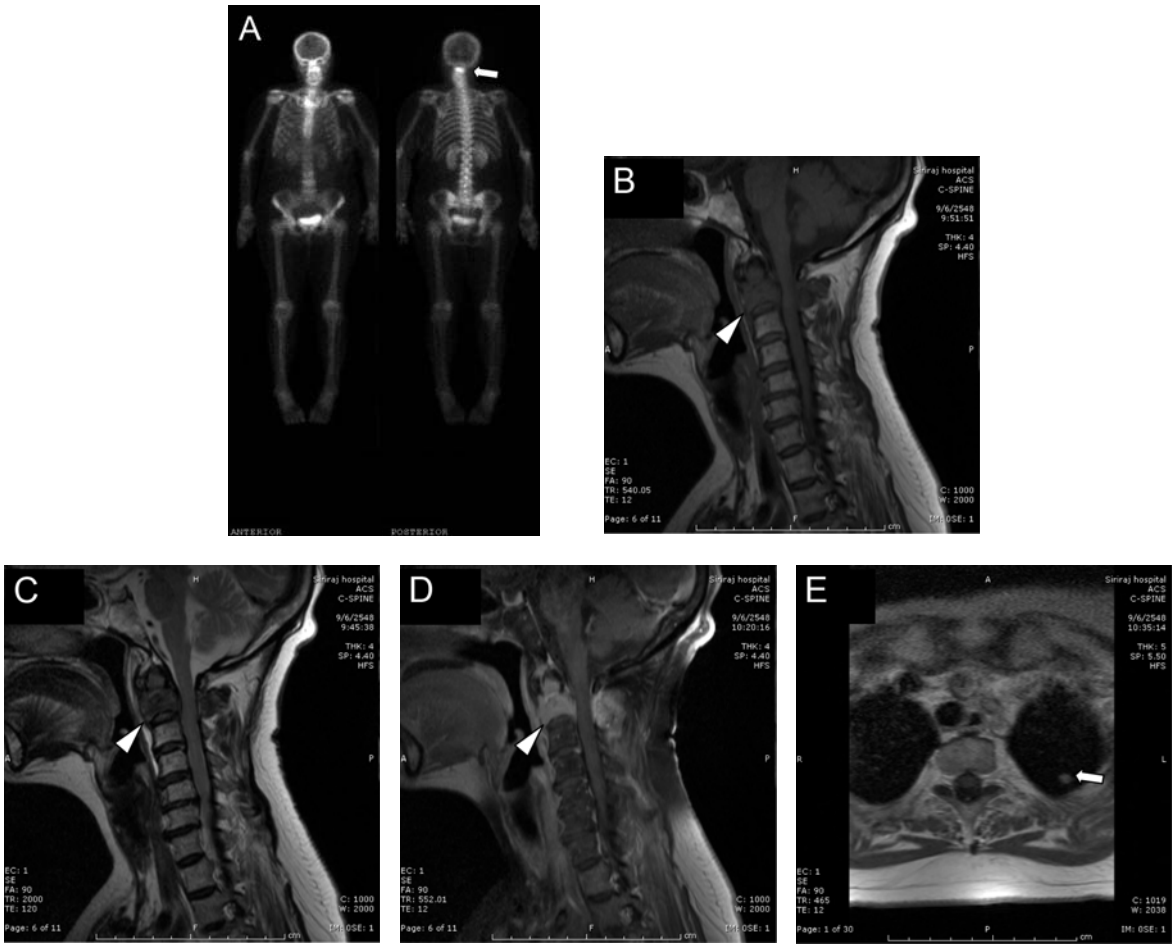

Fig. 5 A case of breast cancer, S/P surgery (A) Bone scintigraphy showed increased radiotracer uptake at C2 vertebra (white arrow), highly suspected bone metastases. (B,C,D) MR imaging revealed iso signal intensity on T1W and heterogeneous increased signal intensity on T2W of C2 vertebra (arrow head). After gadolinium administration showed homogeneous increased enhancement of C2 vertebra. All MR imaging findings are corresponding with vertebral metastasis. (E) MR imaging finding also showed left pulmonary nodule of pulmonary metastasis (white arrow)

becomes visible. Bone scintigraphy may reveal bone metastases up to 18 months before radiography shows them and has 50-80% greater sensitivity[20]. Computed tomography is sensitive in detecting subtle cortical invasion but is less sensitive for medullary bone or bone marrow involvement[5,21]. The advantage of MR imaging in the spine is that it allows demonstration of marrow infiltration which is the first visible manifestation of metastasis in the site and therefore shows secondary tumor deposits at a very early stage. This research is the retrospective reviews of the patients who had known case cancer and received bone scintigraphy before MR imaging study within 1 month.

In 44 lesions of bone scintigraphy positive for vertebral metastases, 40/44 lesions (91%) bone scintigraphy and MR imaging revealed vertebral metastases. It means that the patients whose bone scintigraphy revealed positive for vertebral metastases should received proper management. MR imaging is not more beneficial in this group.

In 24 lesions of negative of bone scintigraphy for vertebral metastases and having clinical bone pain in vertebra, we found that 14/24 lesions (58%) showed

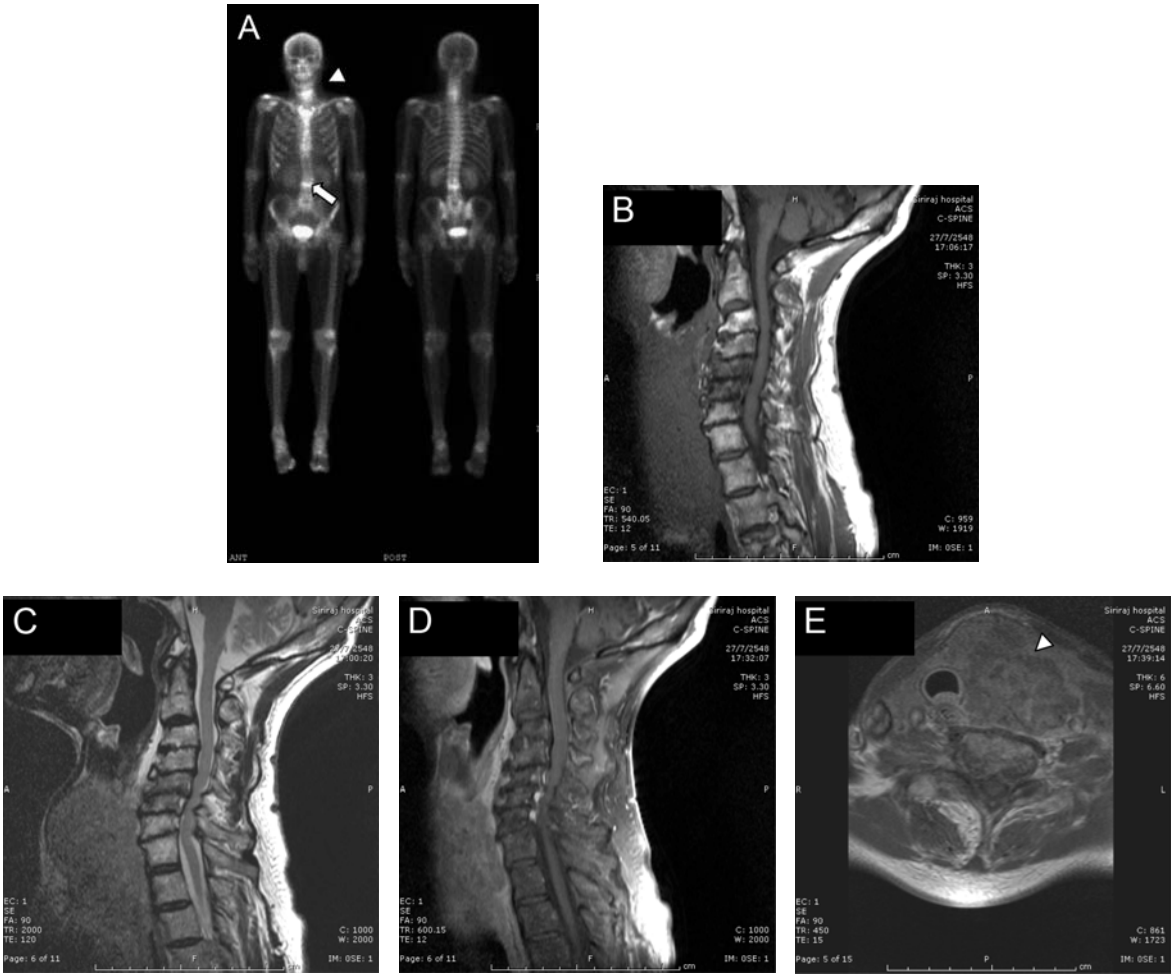

Fig. 6 A case of advanced stage of esophageal cancer. (A) Bone scintigraphy showed increased radiotracer uptake at L3 vertebra (white arrow), suspected bony metastasis. Increased radiotracer uptake at lower cervical vertebra (arrow head), which bony metastases cannot be excluded. (B,C,D) MR imaging of cervical spines on showed no evidence of bony metastases. The MR imaging of C3,C4,C5,C6 vertebrae showed marginal osteophyte with low signal intensity on T1W and T2W without enhancement, compatible with degenerative changes. (E) MR imaging findings also showed soft tissue mass at left side of thyroid gland (arrow head)

positive for vertebral metastases from MR imaging which led to further treatment planning. There are another 12 lesions that were equivocal for vertebral metastasis through bone scintigraphy, but had clinical bone pain in vertebra; 6/12 lesions (50%) were positive for vertebral metastasis through MR imaging. Therefore, further investigation of vertebral metastases by MR imaging is recommended whenever bone scintigraphy is negative or equivocal study but where high clinical grounds of suspicion vertebral metastasis exists. Overall, an increase the detection of vertebral metastasis by MR imaging is superior to bone scintigraphy in 20/80 lesions (25% of all pathologic lesions). This may strongly convince us of the benefits of MR imaging in clinical applications.

In this study, we found that MR imaging is superior to bone scintigraphy in terms of describing an anatomical of vertebral involvement. Furthermore, MR imaging is superior to bone scintigraphy in terms of a differentiation of vertebral pathology such as degenerative change of vertebra or benign osteoporotic fracture, spinal cord compression, surrounding tissue such as lymph node, pulmonary metastasis, pleural effusion. In addition, we found that no specific MR imaging pattern associated with a primary cancer.

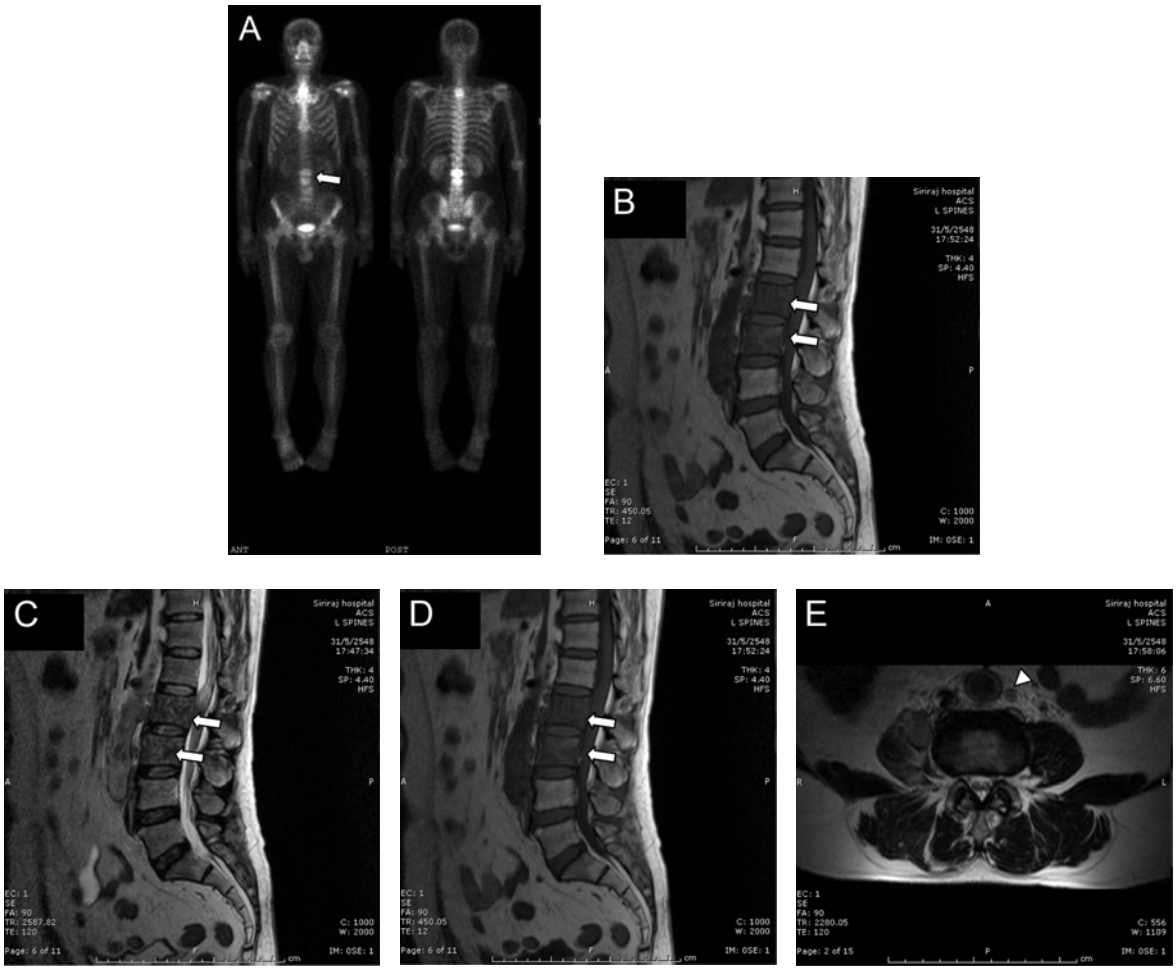

Fig. 7 A case of prostate cancer, presented with low back pain 2 months. (A) Bone scintigraphy on 19/05/2005 showed increased radiotracer uptake at L2-L3 vertebrae (white arrow), which cannot be excluded bone metastases. (B, C, D) MR imaging on 31/05/2005 revealed suggestive of metastases of L2-L3 vertebra (white arrow) with paravertebral soft tissue mass (arrow head). (E) MR imaging findings also showed lymphadenopathy at left side of abdominal aorta (arrow head)

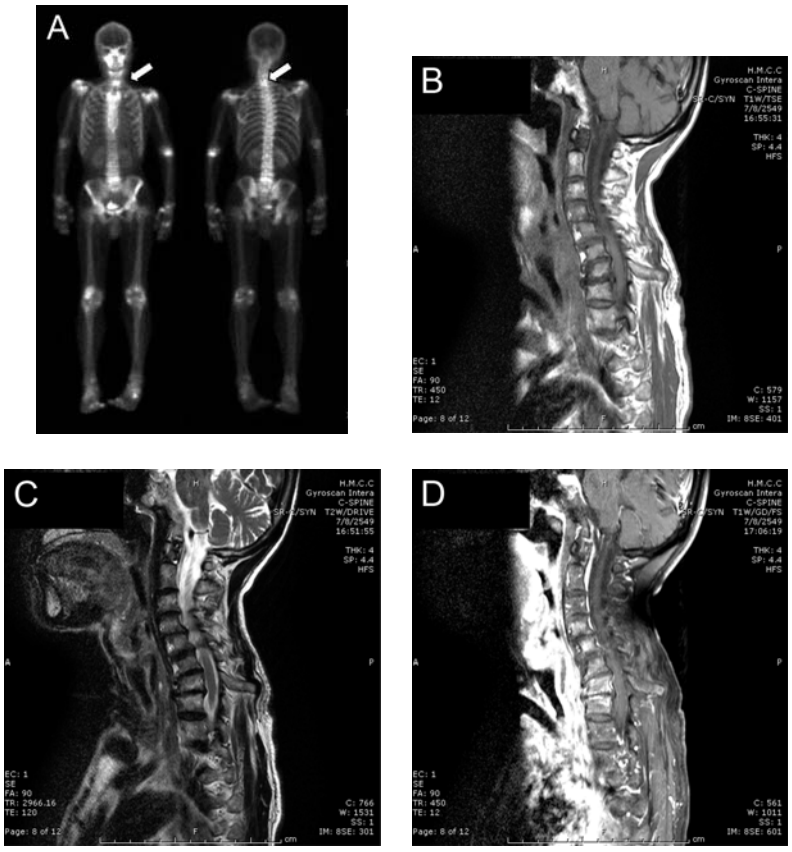

Fig. 8 A case of pyriform cancer, presented with neck pain 1 month. (A) Bone scintigraphy showed increased radiotracer uptake at C7 and T1 vertebrae (white arrow), both shoulders and right acromioclavicular joint which bony metastases cannot be excluded. Degenerative change at L5 vertebra. (B,C,D) MR imaging revealed no demonstrable bony metastases. Degenerative changes of intervertebral T2W of C2-3, C3-4, C4-5, C5-6, C6-7, C7-T1 discs with marginal osteophyte are demonstrated, which compatible with degenerative change of cervical vertebrae

There are limitations in our study. MR imaging (axial scan of T1W + gadolinium administration) without saturated fat was difficult to evaluate in some patients. The efficiency of MR imaging in some patients who had metallic instruments is limited. There is no pathological proof in all patients (we used clinical follow-up clinical with radiation therapy for vertebral metastasis). Lost follow-up in some patients were encountered.

In conclusion, although MR imaging is useful in the detection of early metastases that are localized completely in the bone marrow cavity, basically bone scintigraphy remains that most cost-effective method for examination of the entire skeleton. We conclude that the MR imaging is more efficient than the bone scintigraphy in detecting vertebral metastases, especially in the circumstances that bone scintigraphy are equivocal or negative for vertebral metastases in high clinical suspicious (clinical bone pain in vertebrae). Furthermore, MR imaging is important for further treatment such as radiation therapy or systemic chemotherapy.

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การถ่ายเอ็มอารไอบริเวณกระดูกสันหลังให้คุณค่าเพิ่มกว่าการกวาดภาพกระดูก (bone scintigraphy) ในการค้นหาการแพร่กระจายมายังกระดูกสันหลัง

พิพัฒน์ เชี่ยววิทย์, ณสุดา ด่านชัยวิจิตร, แก้วตา ศิริวิชญ์ไมตรี, สุนันทา เชี่ยววิทย์, กุลธร เทพมงคล

วัตถุประสงค์: *เพื่อศึกษาถึงประโยชน์ที่จะได้รับเพิ่มเติมจากการส่งตรวจคลื่นแม่เหล็กในผู้ป่วยที่สงสัยว่ามีภาวะมะเร็งกระจายมาที่กระดูกสันหลังจากการตรวจด้วย bone scan*

วัสดุและวิธีการ: *ทำการศึกษาย้อนหลังและทำการเปรียบเทียบระหว่างการตรวจด้วย Magnetic Resonance Imaging (MRI) และ bone scan ในผู้ป่วยที่มีภาวะมะเร็งกระจายมาที่กระดูกสันหลังจำนวน 48ราย ในช่วงระหว่างเดือน มกราคม พ.ศ. 2548 ถึง เดือนธันวาคม พ.ศ. 2549 โดย bone scintigraphy ทำการตรวจจากเครื่อง planar scintigraphy และ MRI ทำการตรวจโดยเครื่องตรวจ MRI 1.5 และ 3.0 เทสลา ทำการเก็บข้อมูลที่ตรวจพบใน bone scan และ MRI เกี่ยวกับความผิดปกติของกระดูกสันหลังทั้งจำนวนรอยโรค ระดับของกระดูกสันหลังที่ผิดปกติ และนอกจากนี้ยังรวบรวมข้อมูลเกี่ยวกับการลุกลามเข้าสู่โพรงกระดูกสันหลัง การกดเบียดไขสันหลัง การกระจายของมะเร็งไปยังปอด น้ำในช่องปอด ต่อมน้ำเหลืองที่โต*

ผลการศึกษา: *พบจำนวนรอยโรคทั้งสิ้น 80 รอยโรคจากจำนวนผู้ป่วย 48 ราย เป็นผู้ป่วยชาย 25ราย และผู้ป่วยหญิง 23 รายมีอายุเฉลี่ย 61 ปีและมีช่วงอายุตั้งแต่ 8-84ปี จากจำนวน 80 รอยโรค สามารถแบ่งผู้ป่วยเป็น 3 กลุ่มตามลักษณะของ bone scan ดังนี้ กลุ่มที่1 bone scan ให้ผลบวกในการตรวจพบมะเร็งที่กระจายมายังกระดูกสันหลัง มีจำนวน 44 รอยโรค ในกลุ่มนี้ MRI ให้ผลบวกจำนวน 40 รอยโรค (91%) กลุ่มที่ 2 bone scan ให้ผลลบในการตรวจพบมะเร็งที่กระจายมายังกระดูกสันหลัง มีจำนวน 24 รอยโรค ในกลุ่มนี้ MRI ให้ผลบวกจำนวน 14 รอยโรค (58%) กลุ่มที่ 3 bone scan ให้ผล eqvivocal ในการตรวจพบมะเร็งที่กระจายมายังกระดูกสันหลัง มีจำนวน 12 รอยโรค ในกลุ่มนี้ MRI ให้ผลบวกจำนวน 6 รอยโรค (50%) นอกจากนี้ MRI พบว่ามะเร็งกดเบียดไขสันหลัง 16 ราย และมี 30 รายที่เริ่มมีโพรงไขสันหลังแคบลงจากมะเร็งที่กระจายมายังกระดูกสันหลัง*

สรุป: *MRI เป็นวิธีการตรวจภาวะการกระจายของมะเร็งมาที่กระดูกสันหลังที่มีประสิทธิภาพและมีประโยชน์โดยเฉพาะอย่างยิ่งในกลุ่มที่ bone scan ให้ผล equivocal หรือให้ผลลบโดยที่อาการทางคลินิกสงสัยว่ามีการกระจายของมะเร็งที่กระดูกสันหลัง นอกจากนี้ MRI ยังมีประโยชน์ในการวางแผนการรักษาโรคต่อไป*