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Incidental findings of lumbar spine MRI at Bangkok Metropolitan Administration General Hospital

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Background : *Low back pain is one of the most common symptoms. Magnetic resonance imaging (MRI) is the most sensitive and useful investigation in detecting and delineating spinal disease. An incidental lesion is an asymptomatic lesion found while examining a patient for an unrelated reason.*

Objective : *To determine frequency and majority of incidental findings in patients undergoing MRI of lumbar spine.*

Method : *Five hundred and ninety-seven lumbar spine MRIs in 24 months were reviewed.*

Results : *Incidental findings were found in forty-seven cases (7.8%). There were perineural (Tarlov) cysts 17 cases (36.2%), vertebral hemangiomas 14 cases (29.8%), renal cysts 7 cases (14.9%), uterine leiomyomas 5 cases (10.6%) and synovial cysts 3 cases (6.4%).*

Epidural lipomatosis, horseshoe kidney, dermoid cyst and cystic ovarian tumor, were found one of each case (2.1%). Of these 47 patients, 44 patients (93.6%) had one finding and 3 patients (6.4%) had two findings. There is no difference between genders and age groups in term of incidence of perineural cysts, vertebral hemangiomas, renal cysts and synovial cysts and no difference in age with frequency of uterine leiomyomas.

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Conclusion : *The incidental lesions can be seen in MRI of lumbar spine in about 8%. The major findings show no significant difference between genders and age groups. Although most incidental lesions are asymptomatic, some may be causes of low back pain and hence surgery may be required. Notification and careful interpretation of incidental findings on MRI of lumbar spine are necessary.*

Keywords : *Incidental findings, incidental lesion, lumbar spine, MRI.*

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คลื่นสะท้อนในสนามแม่เหล็กที่โรงพยาบาลกลาง. จุฬาลงกรณ์เวชสาร 2556 พ.ย. - ธ.ค.;
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- บทนำ** : การตรวจวินิจฉัยด้วยคลื่นสะท้อนในสนามแม่เหล็กเป็นการตรวจ
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- วิธีการศึกษา** : ผู้วิจัยเก็บข้อมูลเพศ อายุ การวินิจฉัยโรค และความผิดปกติที่พบ
โดยบังเอิญของผู้ป่วยที่มารับการตรวจกระดูกสันหลังส่วนเอวโดยคลื่น
สะท้อนในสนามแม่เหล็ก
- ผลการศึกษา** : พบความผิดปกติที่พบโดยบังเอิญจากการตรวจกระดูกสันหลังส่วนเอว
โดยคลื่นสะท้อนในสนามแม่เหล็กในผู้ป่วย 47 คน (7.8%) โดยพบ
ถุงน้ำรอบเส้นประสาท 17 ราย (36.2%), เนื้องอกเส้นเลือดของ
กระดูกสันหลัง 14 ราย (29.8%), ถุงน้ำที่ไต 7 ราย (14.9%), เนื้องอก
ของกล้ามเนื้อดลูก 5 ราย (10.6%) และ ถุงน้ำของข้อต่อฟาเซต 3 ราย
(6.4%) ส่วนไขมันในช่องไขสันหลัง, ไตรูปเกือกม้า, ถุงน้ำเดอรัมมอยด์
และเนื้องอกรังไขชนิดถุงน้ำ พบอย่างละ 1 ราย ผู้ป่วย 44 ราย (93.6%)
พบความผิดปกติ 1 ชนิดและผู้ป่วย 3 ราย (6.4%) พบความผิดปกติ
2 ชนิด ไม่พบความแตกต่างอย่างมีนัยสำคัญระหว่างเพศและกลุ่มอายุ
ของผู้ป่วยที่พบถุงน้ำรอบเส้นประสาท, เนื้องอกเส้นเลือดของกระดูก
สันหลัง, ถุงน้ำที่ไตและถุงน้ำของข้อต่อฟาเซต รวมทั้งไม่พบความ
แตกต่างระหว่างกลุ่มอายุในผู้ป่วยที่พบเนื้องอกของกล้ามเนื้อดลูก

- วิจารณ์และสรุป** : ความผิดปกติที่พบโดยบังเอิญจากการตรวจกระดูกสันหลังส่วนเอว โดยคลื่นสะท้อนในสนามแม่เหล็กพบประมาณ 8% โดยไม่พบความแตกต่างอย่างมีนัยสำคัญระหว่างเพศและกลุ่มอายุของผู้ป่วยที่พบถุงน้ำรอบเส้นประสาท, เนื้องอกเส้นเลือดของกระดูกสันหลัง, ถุงน้ำที่ไตและถุงน้ำของข้อต่อฟาเซต รวมทั้งไม่พบความแตกต่างระหว่างกลุ่มอายุในผู้ป่วยที่พบเนื้องอกของกล้ามเนื้อดลูก แม้ว่าความผิดปกติที่พบโดยบังเอิญส่วนใหญ่จะไม่ทำให้เกิดอาการ แต่บางรายก็อาจเป็นสาเหตุของอาการปวดหลังและต้องได้รับการรักษาด้วยการผ่าตัด การสังเกตความผิดปกติเหล่านี้จึงต้องได้รับการใส่ใจและแปลผลอย่างระมัดระวัง
- คำสำคัญ** : ความผิดปกติที่พบ, การตรวจกระดูกสันหลังส่วนเอว, คลื่นสะท้อนในสนามแม่เหล็ก.

Low back pain is one of the most common presenting symptom of the patients at outpatient department.⁽¹⁾ Magnetic resonance imaging (MRI) is the most sensitive and useful investigation in detecting and delineating spinal disease.^(2,3) An incidental lesion is an asymptomatic lesion found while examining a patient for an unrelated reason. The purpose of this study was to determine major types and their frequencies of incidental findings in patients undergoing MRI of lumbar spine and the clinical importance of the findings.

Materials and Methods

Five hundred and ninety-seven cases underwent MRI of lumbar spine examined over a 24-month period were retrospectively reviewed by a radiologist.

Coronal Haste Myelography, sagittal and axial T1-and T2-weighted images were obtained in all cases.

The variables are tabulated. The Fisher and chi-square tests were used for analysis of the relationship of the incidental findings with patient characteristics. The frequency of each class of incidental finding was evaluated with respect to gender and age of the patient.

Results

Incidental findings were found in 47 cases (7.8%) ranging in age from 31 to 85 years, with mean age of 59.1 years.

The incidental findings were perineural cysts (Tarlov cysts) in 17 cases (36.2%), vertebral hemangiomas in 14 cases (29.8%), renal cysts in 7 cases (14.9%), uterine leiomyomas in 5 cases (10.6%) and synovial cysts in 3 cases (6.4%). Epidural lipomatosis, horseshoe kidney, dermoid cyst and cystic ovarian tumor, were found one for each case (2.1%). Of these 47 patients, 44 (93.6%) had one finding and 3 (6.4%) had two findings. None of the findings were related to the patients' symptoms.

Thirteen cases from 31 to 82 years old, with mean age of 61.6 years were in men group. Thirty-four cases from 36 to 85 years old, with mean age of 44.7 years were in women group.

The age of the patients was divided into two groups: less than 50 years and 50 years and more. The incidences of the incidental findings of the lumbar spine by patient's gender and age are shown in Tables 1 and 2, respectively.

Table 1. Incidence of incidental findings of the MRI of lumbar spine categorized by gender.

Sex	Perineural cysts	Vertebral hemangiomas	Renal cysts	Synovial cysts	Total
No. (%)					
M	3 (6.4%)	5 (10.6%)	4 (8.5%)	0 (0%)	230
F	14 (29.8%)	9 (19.1%)	3 (6.4%)	3 (6.4%)	367
p(Fisher)	0.0812	1	0.4379	0.2883	
p(Chi)	0.0727	0.8268	0.3086	0.1692	
Total	17 (36.2%)	14 (29.8%)	7 (14.9%)	3 (6.4%)	597

Table 2. Incidence of incidental findings of the MRI of lumbar spine categorized by age.

Age (y)	Perineural cysts	Vertebral hemangiomas	Renal cysts	Uterine leiomyomas	Synovial cysts	Total
No.(%)						
<50	3 (6.4%)	2 (4.2%)	1 (2.1%)	3 (6.4%)	0 (0%)	163
≥50	14 (29.8%)	12 (2.6%)	6 (12.8%)	2 (4.2%)	3 (6.4%)	434
p(Fisher)	0.5806	0.3706	0.6802	0.1284	0.5659	
p(Chi)	0.3656	0.2686	0.4368	0.0994	0.2873	
Total	17 (36.2%)	14 (29.8%)	7 (14.9%)	5 (10.6%)	3(6.4%)	597

Clinical diagnoses of the patients were disc herniation in 441 cases, fracture in 37 cases, failed back surgery in 35 cases, non-specific back pain in 25 cases, cord and nerve root compression in 23 cases, spinal tumor in 19 cases, and spinal infection in 17 cases. MRI confirmed the clinical diagnosis and delineated the pathology in 545 cases (91.3%), and changed the diagnosis in 52 cases (8.7%).

Discussion

An incidental lesion is asymptomatic lesion found while examining a patient for unrelated reason. The impact of detecting incidental lesions on patient health outcome is uncertain, but an incidental finding may be more significant than the suspected disease itself. Clinical judgment needs to be exercised in reporting these incidental findings. A few studies focused on the detection of incidental findings during MRI of the lumbar spine.^(4,5)

The overall frequency of incidental lesion in this study was the same as that reported in a previous study, 7.8% and 8.4%,⁽⁴⁾ respectively; however, the ranking of the most commonly found lumbar spinal lesions differed. Vertebral hemangiomas were the most frequently found in this previous study, followed in order by perineural cysts, fibrolipomas, synovial

cysts, and sacral meningoceles⁽⁴⁾; whereas in the present study perineural cysts are the most common class, with vertebral hemangiomas, renal cysts, uterine leiomyomas and synovial cysts detected in decreasing frequencies.

Perineural cysts (Figure 1) are lesions of nerve roots most often found in the sacral region shown as CSF-filled sac located in the spinal canal. They can be distinguished from other meningeal cysts by nerve fiber-filled walls.⁽⁴⁾ Although most perineural cysts cause no symptom, they can be symptomatic and surgery may be needed.⁽⁶⁾ The incidence of perineural cyst in this study is 36.2%.

Vertebral hemangiomas (Figure 2) are benign vascular tumors and shown in 11% of spines in autopsy. Less than 1% of vertebral hemangiomas cause symptoms from pathological fracture or cord compression.⁽⁷⁾ Histopathologically, hemangiomas are thin-walled, blood-filled vessels and sinuses lined by endothelium and interspersed among the longitudinally oriented trabeculae of bones. The dilated vascular channels are set in a substratum of fatty marrow.⁽⁸⁾ They show increased signal intensity (SI) on both T1- and T2-weighted images.⁽⁹⁾ The incidence of vertebral hemangioma in this study is 29.8%.

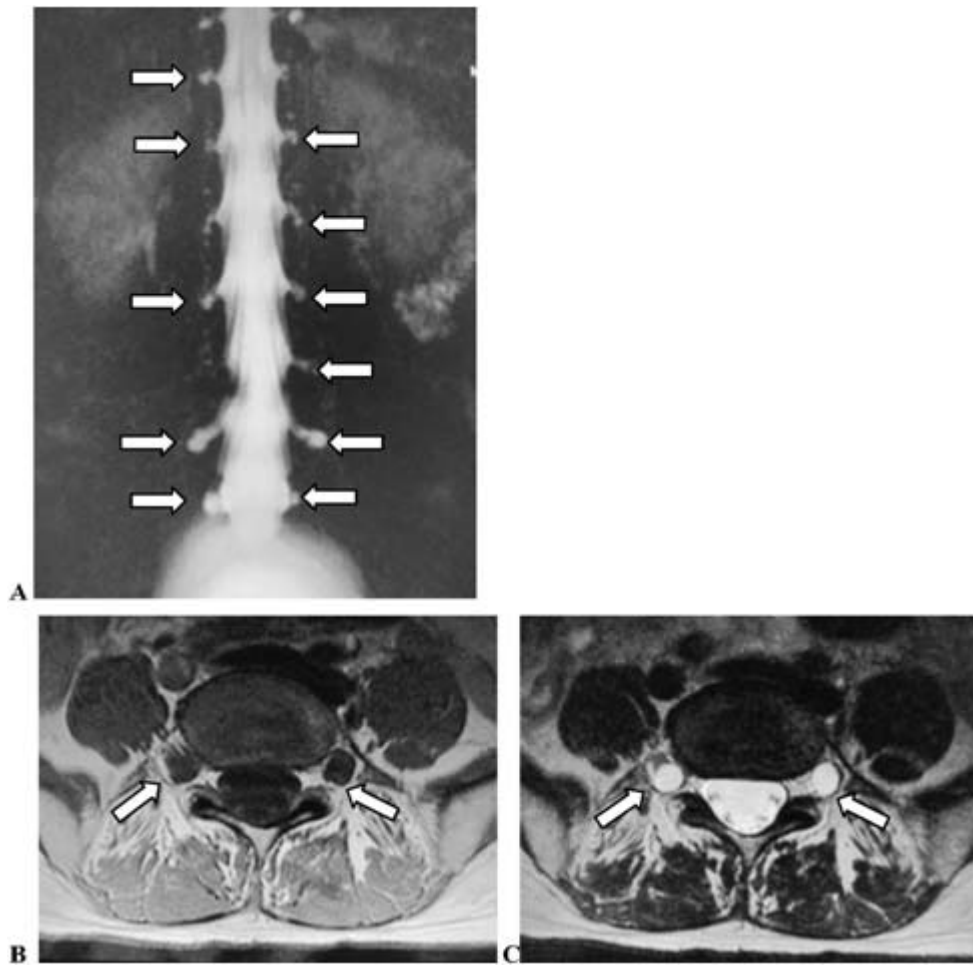


Figure 1. Perineural (Tarlov) cysts : Coronal Haste Myelography (A), axial T1-weighted image (B), and axial T2-weighted image (C) show bilateral perineural cysts (arrows).

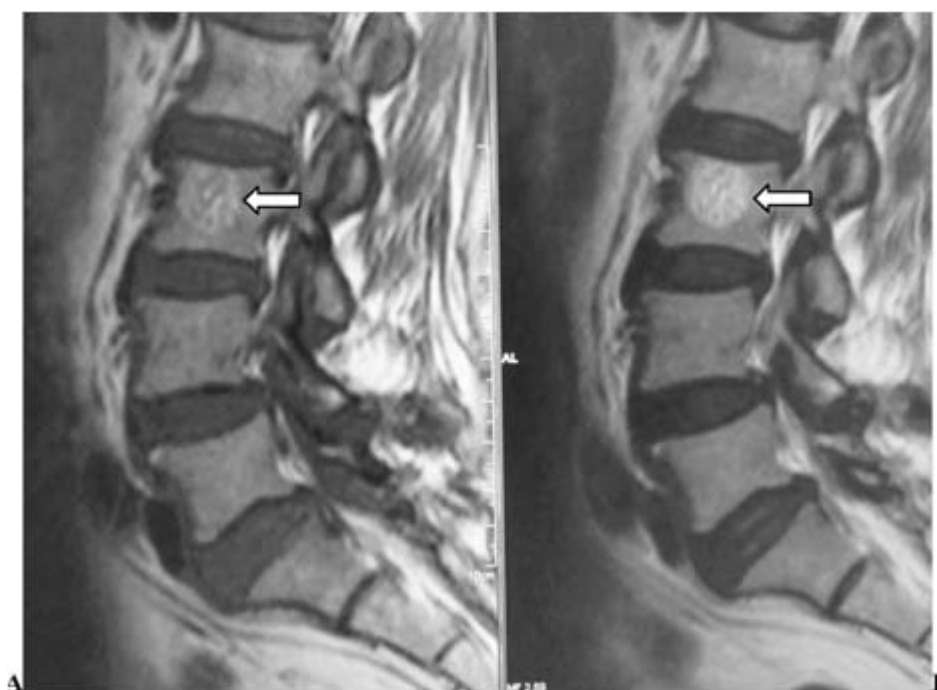


Figure 2. Vertebral hemangioma : Sagittal T1-weighted image (A) and sagittal T2-weighted image (B) show round high signal intensity lesion in L3 vertebral body (arrows).

Simple renal cysts contain fluid which shows low SI on T1 and high SI on T2-weighted sequences. Complicated cysts are caused by hemorrhage and infection. Calcification, septation, wall-thickening and high SI may develop and make it difficult to differentiate from cystic tumor.⁽¹⁰⁾ The incidence of renal cyst in this study is 14.9%; all are simple cysts (Figure 3).

Uterine leiomyomas are benign, and the most common tumor of the female genital tract, up to 25% of the female population older than 35 years. The symptoms associated with uterine leiomyomas may be protean, though most women are generally asymptomatic. The most common symptom is bleeding, however, pressure effect, infertility, fetal wastage, dystocia and a palpable mass do occur. Rarely, leiomyomas may twist or become infected.⁽¹¹⁾ Leiomyomas are well-circumscribed, homogeneous low SI masses on T2-weighted images.⁽¹²⁾ Degeneration often occurs in leiomyomas greater than

3 to 5 cm causing heterogeneous SI.⁽¹³⁾ Ones with hemorrhagic degeneration exhibit high SI areas on T1-weighted images. The incidence of uterine leiomyomas in this study is 10.6%; all are small with homogeneous low SI on T2-weighted images (Figure 4).

Synovial cysts are the lesions of the spine associated with facet arthropathy and can cause radicular symptoms.^(14,15) They appear as round, well-circumscribed epidural cystic mass, located posterolateral to the thecal sac, adjacent to a degenerated facet joint. Most common location is at L4-5 level, followed by L3-4 and L5-S1^(15,16) which represent the most mobile segments and the most common locations for degenerative disease. They may arise as a proliferation of articular tissue resulting from chronic irritation.⁽¹⁷⁾ The incidence of synovial cysts in this study is 6.4%; all lesions are small, without nerve root compression (Figure 5).

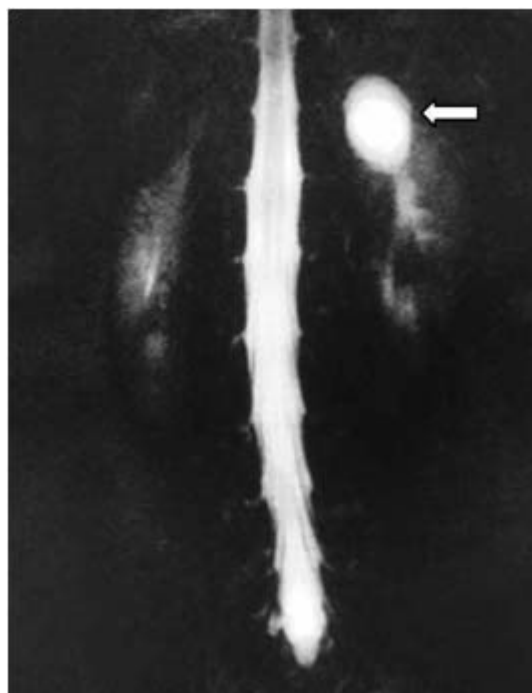


Figure 3. Renal cyst : Coronal Haste Myelography reveals a simple cyst at upper pole of the left kidney (arrow).



Figure 4. Uterine leiomyomas : Sagittal T2-weighted image shows multiple low SI masses within the uterus (arrows).

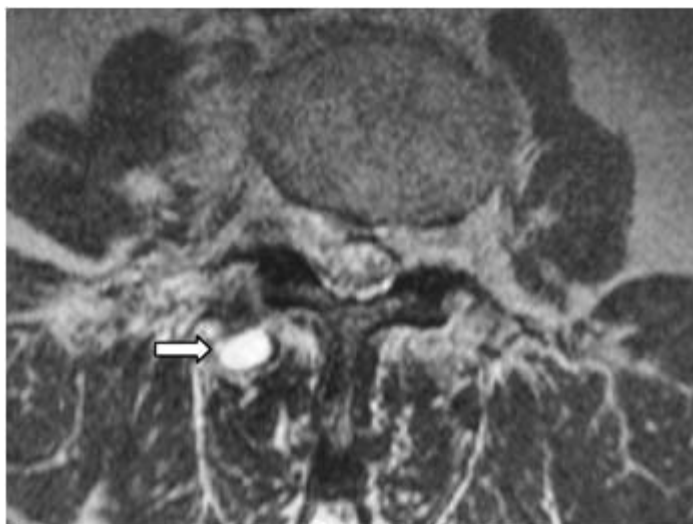


Figure 5. Synovial cyst : Axial T2-weighted image shows a cyst adjacent to facet joint (arrow).

Epidural lipomatosis is increased amount of adipose tissue in the epidural space of the thoracic and lumbar spine. It can be found in some patients with obesity but most commonly in patients with corticosteroid therapy. Lipomatous tissue may be

focal and asymptomatic, or show significant mass effect causing cord compression.⁽¹⁸⁾ Single case of epidural lipomatosis in this study shows no significant mass effect (Figure 6).

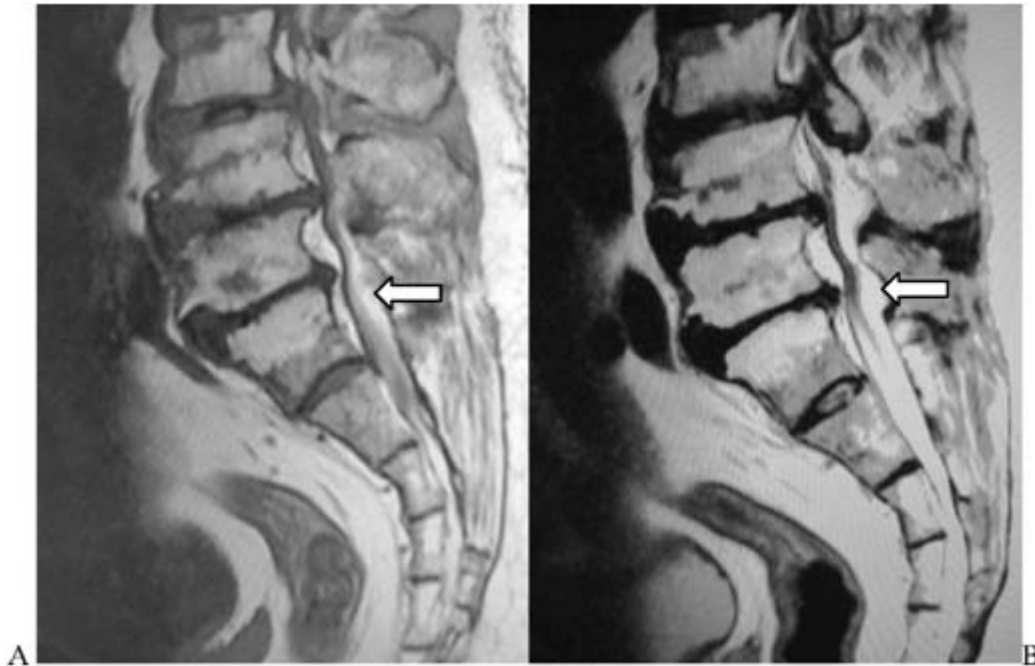


Figure 6. Epidural lipomatosis : Sagittal T1-weighted image (A) and sagittal T2-weighted image (B) show increased fat in epidural space (arrows).

Horseshoe kidney is a congenital anomaly in which the kidneys are located on each side of the midline and fused at the level of their lower pole in the so-called isthmus (Figure 7). The kidneys are typically malrotated with both renal hila pointing anteriorly. While most patients with horseshoe kidney are asymptomatic and have preserved renal function, a higher incidence of disease has been associated with this anatomic variant, including stenosis at the ureteropelvic junction, stones and infection. The incidence of renal cancer in these patients seems to be similar to that of the general population, though a higher incidence of renal carcinoid and Wilms tumors has been described.^(19,20) Renal cell carcinoma (RCC) is, however, the most common neoplasm in these patients.⁽²¹⁾ The case of horseshoe kidney in this study is asymptomatic.

Dermoid cysts are also referred to as mature cystic teratomas. They are the most common ovarian

tumors in children and young adults but can appear in any age. In gross pathology, a unilocular cyst filled with sebaceous material is noted. Additional contents of the mass can include fat, hemorrhage, hair, bones and teeth. Lesions vary from 0.5 cm to more than 40 cm in size. Malignant conversion to squamous cell carcinoma occurs in 2%⁽²²⁾ and has been described in lesions larger than 10 cm and in post-menopausal women. Most tumors are discovered incidentally on physical examination, imaging studies or surgery. If clinical symptoms are present, they are often nonspecific such as pelvic pain or pressure, abdominal swelling or mass, and abnormal uterine bleeding. However, when complications present, acute abdominal pain occur. The most common complication is ovarian torsion, followed by rupture inducing chemical peritonitis and infection.⁽²³⁾ Single case of dermoid cyst in this study is asymptomatic (Figure 8).

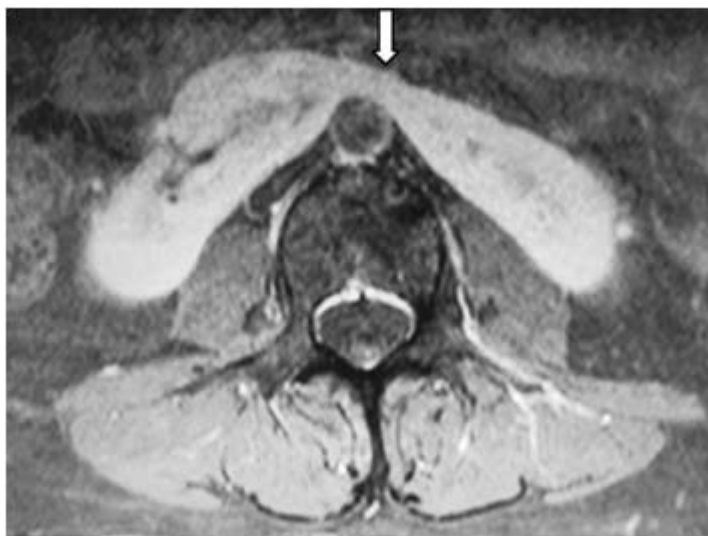


Figure 7. Horseshoe kidney : Post gadolinium axial T1-weighted image with fat suppression shows fused kidney at midline (arrow).

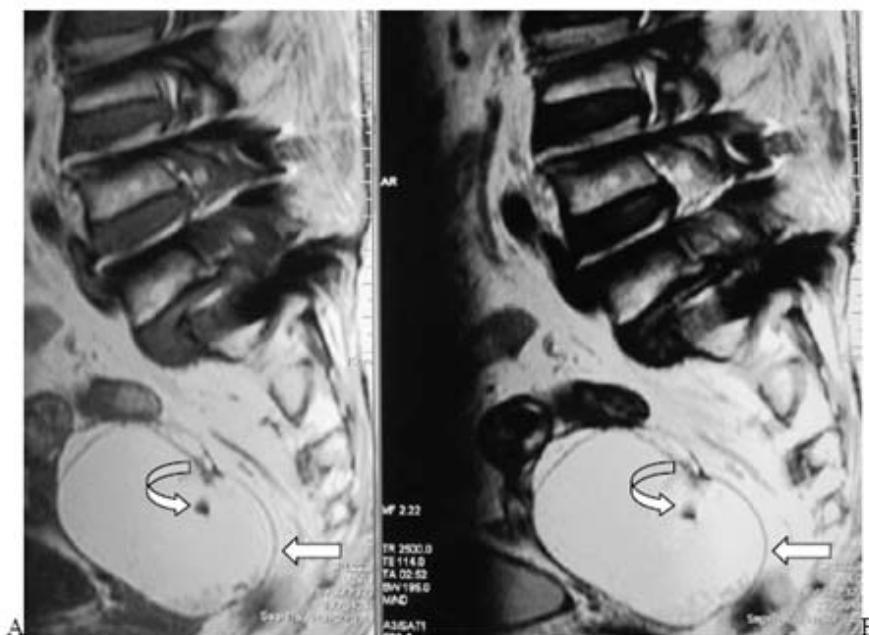


Figure 8. Dermoid cyst : Sagittal T1-weighted image (A) and sagittal T2-weighted image (B) reveal a pelvic mass containing fat (arrows). Note a small low SI lesion within it, considered tooth (curve arrows).

Approximately, 80% of ovarian tumors are benign. The clinical presentation is nonspecific and is due to the mass effects of enlarging tumors. Serous and mucinous tumors are the most common surface epithelial tumors and account for 45% to 50% of all benign ovarian neoplasms. In the post-menopausal population, serous cystadenomas represent 80% of

benign lesions.⁽²⁴⁾ Serous cystadenomas are most commonly unilocular and fluid filled with a thin wall. They can be multilocular with thin septations. Usually the cysts contain simple fluid with low signal intensity on T1- and high signal intensity (SI) on T2-weighted images (Figure 9).

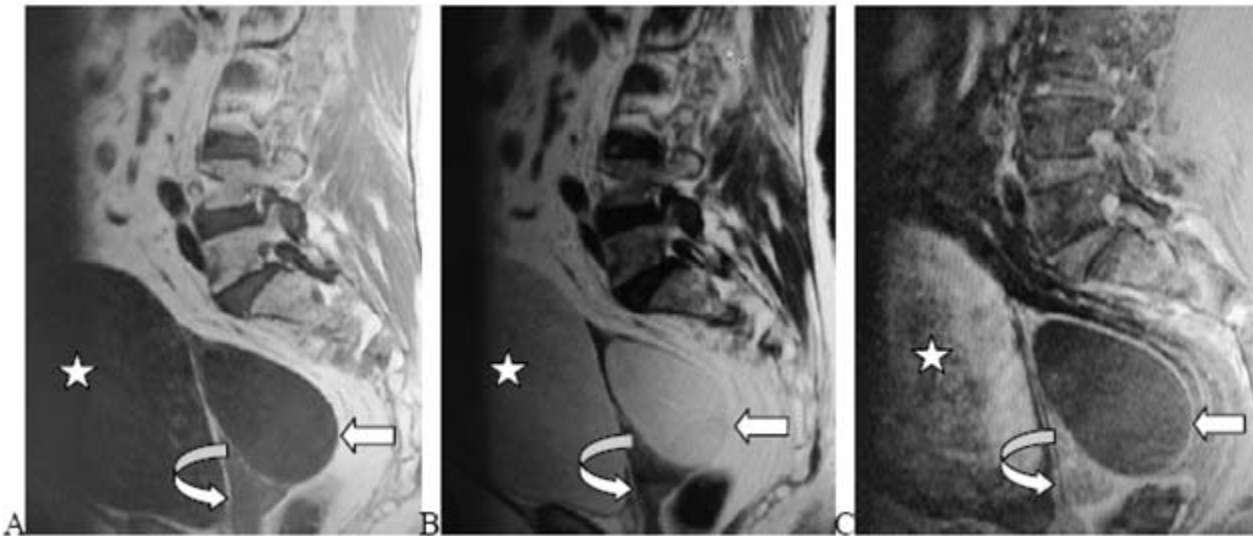


Figure 9. Cystic ovarian tumor : Sagittal T1-weighted image (A), sagittal T2-weighted image (B) and post gadolinium sagittal T1-weighted image with fat suppression (C) reveal a unilocular cyst (arrows) abutting uterus (curve arrows), posterior to urinary bladder (stars) in postmenopausal woman.

There is no difference between genders and age groups in term of incidence of perineural cysts, vertebral hemangiomas, renal cysts and synovial cysts in this study and similarly, no difference between age groups with respect to incidence of uterine leiomyomas. Another study shows that perineural cysts and synovial cysts were significantly more frequent in individuals younger than 50 years ($p < 0.05$), without significant difference between genders.⁽⁴⁾

Limitations of this study are only one radiologist reviewed the images and the diagnoses based on imaging characteristics without pathological tissue. Six cases had 1-year follow up MRI due to persistent or recurrent back pain, 4 cases showed no significant change of the incidental lesions (perineural cysts 2 cases, hemangioma 1 case and renal cyst 1 case), and the lesions were obscured by pedicular screws in other two cases (perineural cyst 1 case and hemangioma 1 case).

Other lesions that can incidentally be seen and may be the cause of low back pain including pelvic lesions such as rectal carcinoma, retroperitoneal sarcoma, ovarian cancer, and aortic aneurysm.⁽⁵⁾

Conclusion

MRI is the most sensitive and useful investigation in detecting and delineating spinal disease. The incidental lesions can be seen in MRI of lumbar spine in about 8%. The major findings show no significant difference between genders and age groups. Although most of them cause no symptom, some may be the cause of low back pain and surgery may be required. Notification and careful interpretation of incidental findings on MRI of lumbar spine are therefore necessary.

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