Original Article

Extraspinal incidental findings of spinal MRI

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Summary:

Background: Magnetic resonance imaging (MRI) is the modality of choice for investigation of disorders of the spine. The use of spinal MRI imaging has increased over the last few years, with improvement in hardware such as magnets, coils as well as imaging techniques. Which should lead to accurate reporting of these examinations includes identifying the incidental abnormalities even if they are not related to the spine.

Objective: The objective is to evaluate the incidence, types and associated variables of unsuspected Extraspinal findings (incidental findings) by MRI spine and with correlation to the sex, age group, types of these findings and the benefit of their early detection.

Patients and methods: A retrospective study of 507 patients was reviewed for MRI spine at Baghdad teaching hospital and x- ray institute who underwent imaging between January 2011 and fifteenth of august 2012.

Results: From the 507 patients, incidental finding were detected in 83 patients (16.37 %) some of them have more than one incidental finding, this result showed significant association with age above 60 years, ($p \leq 0.05$)

Conclusion: A systematic approach to the MRI of the spine should include assessment of tissues and organs outside the region of clinical interest to detect and report any incidental abnormality which could have significant impact on patient's management.

Keywords : spinal MRI ,extraspinal , incidental finding, incidentaloma.

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Introduction:

The evolution of new diagnostic techniques has revolutionized the practice of medicine and in fact, the nature of medicine itself. Technology has also expanded the "visual" field of medicine: However, there are unintended consequences, one of which is the discovery of an anomaly during the course of looking for something else – incidental findings or "incidentalomas". Technology in general and imaging specifically offer much in service to physicians and their patients. However, it behoves physicians to ensure that technology supplements but does not replace good clinical judgment. [1]Therefore, it is vital that the radiologist is able to judge whether the lesion requires any further investigation (e.g., solitary pulmonary nodule, soft-tissue sarcoma, etc) or just a mention in the report without necessarily needing further follow- up (e.g., simple renal cysts, small uterine fibroid, etc).[2,3]MRI has dramatically enhanced spine imaging, due to its superior tissue resolution, multiplanar imaging capabilities, noninvasive nature, and freedom from the artifact produced by bone in CT.[4]. However ; MRI examination of the spine will inevitably show other organs near the spine like the thyroid in cervical spine exams, the lungs in dorsal spine exams , the liver and aorta in dorsal and lumbar spine exams ,the kidneys, uterus, ovaries in lumbosacral exams and of course lymph nodes may be visible in any of the spinal MRI exams ; so we aimed at this study to search for incidental findings by carefully assessing any of the mentioned organs during spinal MRI examination and to evaluate the frequency of their detection in relation to age, sex and region of examination and to try to study the advantages and disadvantages of their detection.

Patients and Methods:

Retrospective study of 507 serial MRI spine scans requested for patients with backache, neurological deficit or other cause related to the spine. The patients were examined in Baghdad teaching hospital or in the X-ray institute. Further evaluations was done by other imaging modalities (CT. US, IVU, and MRI) for few patients at Baghdad teaching

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hospital and x ray institute. The results were tabulated and analyzed statistically using the Chi square test with P value ≤ 0.05 considered to be significant. All MR examinations were performed on a 1.5 TMRI system (PHILIPS-809CCFF, achieva) at Baghdad teaching hospital and 1.5 TMRI system (Medpc ,Avanto ,Germany)at the x -ray institute. T2-weighted images were obtained in the axial plane and T1-weighted, T2- Weighted, images were obtained in the sagittal plane while the patient was in a supine Position. For sagittal imaging, a field of view of 35 cm x 35 cm and slice thickness of 4 mm at x-ray institute and 3 mm at Baghdad teaching hospital were used; for axial imaging, a field of view of 24x 24 cm at the x ray institute and 20 x 20 at Baghdad teaching hospital, and slice thickness of 4 mm were used in both of x ray institute and Baghdad teaching hospital. The following MR sequences were performed in the sagittal plane: T1-weighted spin-echo (TR range/TE range, 400–500/9–14), and T2-weighted (3800/90-120). In the axial plane, T2-weighted turbo spin-echo (TR range/ TE, 3000–4000/60) sequence was performed.

Results:

Our study population included (211) males (41.6%) and (296) females (48.4 %) Who underwent imaging between January 2011 and fifteenth of august 2012. The age distributions were as follows: 19 years old or younger (15) patients (2.95 %); 20–29 years old, (70) patients (13.8%); ,30-39 years old ,(115) patient s(22.68%),40– 49 years old, (125) patients(24.65%) ,50-59 years old (118) patients ,(23.27 %); and 60 years old or older, (60) patients (11.83%). Of the 507 patient who underwent spinal MRI, The lumbar spine was the higher number of the requested exam (n=362) followed by the cervical spine (n=132) while the dorsal spine was the least one (n=13).Incidental findings (IF) were demonstrated in 83 patients (16.37 %). The distribution of Incidental findings was as follows: In the lumbar spine the number (n-59) in the cervical spine (n=20) while in the dorsal spine (n= 4).Results showed no significant relation between gender and incidental findings ($p \geq 0.05$), however the percentage of incidental findings were higher in female (18.92%) than male (12.8%) .Age appeared to have a significant relation with the prevalence of higher percentage of incidental findings ($p \leq 0.05$). The highest percentage of incidental findings was in age group ≥60 years (26.5%) while the younger age groups showed lower incidence of incidental findings, as shown in figure1.

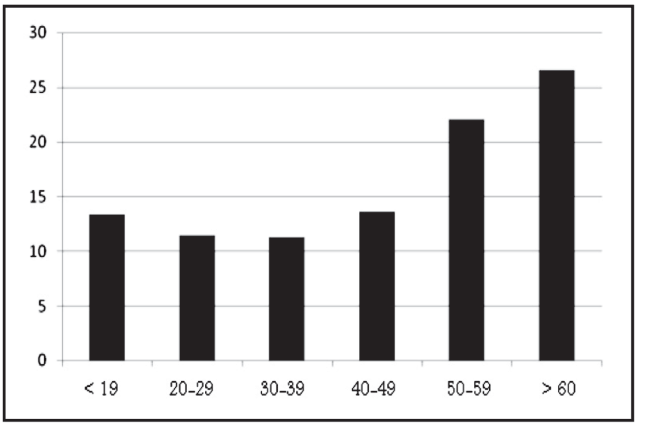

Figure 1: the relation between age and number of incidental findings

Table 1 shows the types and numbers of incidental findings detected in different organs and systems:
Table (1)

Urinary system	**(47) cases**
Renal cyst	**37**
Hydronephrosis	**5**
Absent kidney	**2**
PUJ obstruction	**1**
Dysplastic kidney	**1**
Urinary bladder tumor	**1**
Thyroid gland	**(17) cases**
Multinodular goiter	**15**
Solitary nodule	**2**
Female reproductive system	**(10) cases**
Cystic ovarian lesion	**3**
Thick endometrium	**3**
Nabothian cysts	**3**
Uterine fibroid	**1**
Liver (3) cases	
• **Hemangioma**	**1**
• **Metastases**	**1**
• **Liver Cyst**	**1**
Vascular system (2) cases	
Aortic aneurysm	**1**
Aberrant right subclavian artery	**1**
Lymphadenopathy	**2**
Arachnoid cyst in the brain	**1**
Sacral bone lesion	**1**
Splenomegaly	**1**

Discussion:

In the current study, 507 patients were examined and 83 of them had at least one incidental finding, some of these findings were not significant clinically, while other findings were important and early detection of them may lead to decrease morbidity and mortality rates. These finding were commonly seen at the kidney and female reproductive system then followed by the thyroid gland, GIT, brain, CVS and musculoskeletal system. In our study there was significant relation of the prevalence of incidental finding in the older age group i.e. and we noticed that the age group was the higher rate of incidental finding ,and this could be due to increasing incidence of disease with increasing age. This age-specific effect for incidental finding is consistent with another study done on incidental finding on brain MRI done by Illes et al [5] If we compare the percentage of incidental findings in our study with similar studies ; Wagner et al reported 202 incidental findings in 2500 lumbar spine MRI, one explanation for that may be that Wagner conducted his study over 5 years , and he focused on the effect of Picture archiving and communication system(PACS) over detection of incidental findings , so the in the pre-PACS era the percentage of incidental findings were considerably lower (3.8 % in the pre-PACS era to -9.8%-10.6 % after the introduction of PACS system.[6]. Another study by Green L reported 25 incidental findings in 300 MRI examinations of the lumbar spine (8.33%) during the time of PACS implementation at the author's institute.[7]

In our study 362 patients were examined for the lumbar spine and incidental findings were seen in 59 patients (16.3%) which is slightly higher than the percentage of incidental findings found in the previous two studies, one explanation may be that our study was performed in a major tertiary center in our country (the medical city) with consequent expected higher comorbidity, yet another possible explanation is the continuous advances in the resolution and quality of the MRI machines.The most common incidental lesion detected was renal cyst, which is the same result seen in a study done by Hegenscheid et al [8] By comparing the types of lesions detected with a study done by Kamath et al , we find very similar results with the most commonly seen lesions being renal cysts.[9]A trail to further characterize renal cysts detected incidentally is important in order not to miss potentially serious cystic lesions, as Five to 10% of renal cell carcinomas have a cystic appearance. [10]A retrospective study done by Dall>Oglio et al showed that incidentally detected renal tumors have a better prognosis and provided longer disease-free survival than the symptomatic tumors.[11]In a retrospective study by Frager et al [12] of 1517 lumbar CT examinations, extra spinal pathology was demonstrated in 22 (1.45%) including retroperitoneal tumors and Lymphadenopathy as well as vascular, urinary tract and gynecologic abnormalities. Although infrequent, some of the findings had serious clinical implications. The lower percentage of incidental findings found in CT of the lumbar spine in comparison with MRI may be relates to the higher soft tissue resolution and direct multiplanar imaging of MRI , in comparison with the lower soft tissue resolution and reformatting for the sagittal and coronal images used in CT.A potential limitation of this study is that it was a retrospective study, with the images being reviewed after the patient had left the MRI department which made further evaluation of the incidental findings detected not possible (otherwise another MRI sequence or imaging in another plane or even requesting other imaging examination or tests could have increased the specificity of the diagnosis of these incidental findings .One of the exceptions is illustrated in (fig. 2) where a patient was referred for MRI of the lumbar spine for backache and a right sided cystic lesion was discovered in the right kidney which proved to be a dilated renal pelvis and a PUJ obstruction was proved by IVU and CT scan upon request of the radiologist and proper treatment and salvage of the kidney was possible.One of the important advantages of searching for and reporting an incidental finding is that the incidental finding itself may be the explanation for the patients symptom as was seen in the case illustrated in (fig.3) ,where an aortic aneurysm was incidentally discovered in a patient who was referred for lumbar MRI because of backache. The aneurysm itself may be responsible for the patient's complain as vascular causes of lumbosacral radiculopathy secondary to direct compression of nerve roots by aneurysmal formations of the aorta or its principal branches are reported [13,14] .Inspite of the forementioned advantages of searching for and reporting " incdentalomas", Many radiologists and nonradiologic physicians believe we should not report incidentalomas if they appear benign [15]. There is yet another problem with reporting every incidentaloma: overdiagnosis, defined as "diagnosis of an illness, disease, or cancer that never becomes symptomatic, is not fatal, and may continue until the individual dies from other causes." [16]. On the other hand ; The physician

may be concerned about being blamed for missing an important diagnosis and face future litigation[17]So, there is no substitute for good judgment when reporting incidental

findings in order not put unnecessary extra –workload on the radiology department and other hospital departments by overemphasizing an insignificant incidental finding or an incidentaloma, and also not to put extra-burden on the patient and referring physician even as they may harbor lingering doubts and fear that a potentially serious disease will go untreated. [18]

Conclusion:

Incidental findings are common in the MRI images of the spine. . These incidental findings may be more significant than the spinal problems being evaluated and can have significant impact on patient management and medico legal implications to the radiologist. With this purpose in mind, a systematic approach to the MRI of the spine should include assessment of tissues and organs outside the region of clinical interest to detect any incidental abnormality .The radiologist should not hesitate to ask for other tests to confirm the diagnosis of a suspected serious incidental finding and for this purpose, good communication and cooperation with the referring clinician cannot be overemphasized.

Author contributions

Salam M. Joori FJMC : Acquisition of data analysis and interpretation of data

Mays R. Albeer FIBMS: Study conception, interpretation of data, drafting of manuscript and critical revision

Duraid S. Al-Baldawi M. B. Ch. B.: Study conception, design, acquisition of data analysis, drafting of manuscript.

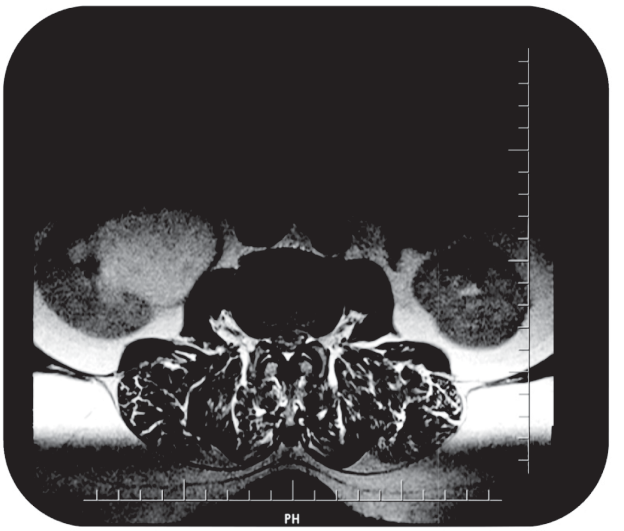

Figure 2: Lumbar spine MRI showing dilated right renal pelvis , which was confirmed to be due to PUJ obstruction by an IVU.

Figure 3: lumbar spinal MRI showed an aortic aneurysm measuring 5.5 cm in diameter.

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