Received: 2013.12.21
Accepted: 2014.01.07
Published: 2014.08.01

On Unwarranted Performance of MRI Scans

Monika Bekiesińska-Figatowska

Department of Diagnostic Imaging, Institute of Mother and Child, Warsaw, Poland

Author's address: Monika Bekiesińska-Figatowska, Department of Diagnostic Imaging, Institute of Mother and Child, Kasprzaka 17A Str., 01-211 Warsaw, Poland e-mail: m.figatowska@mp.pl

Summary

Having read the paper by Oikarinen et al. in the penultimate issue of *Insights into Imaging*, the author discusses the absurdities of everyday work of the radiologist in the MRI unit, concluding that delayed terms of appointments, despite numerous facilities being available in Poland, are largely due to the unwarranted referrals of patients to MRI examinations, which makes the patients who truly require them wait very long or decide to pay for the examination out of their own pockets; radiologists should get involved in the fight against unwarranted studies, even through the use of such expressions as "anatomical variant", "does not require further inspection", "no clinical significance", "MRI is not the first study in the diagnostic algorithm" in warranted cases and by contacting the referring physician (in agreement with the head of the unit/department) to politely explain the absurdity of referral and refuse the test in the most absurd cases.

Keywords: MRI • Unwarranted Referrals • Ways to Solve the Problem

PDF file: <http://www.polradiol.com/abstract/index/idArt/890225>

Background

The penultimate issue of *Insights into Imaging*, a journal of the European Society of Radiology, contained an article by Finnish authors on inappropriate acquisition of MRI scans [1]. The article triggered the writing of this text, which is to express author's frustration as a physician encountering similar cases each time she sits behind the MRI console while keeping control over the queue of patients awaiting MRI scans at her center. At the moment of writing this article (December 2013), appointments are scheduled for October 2014; this situation takes place in Warsaw – a town with more than 50 scanners available at the moment within the metropolitan area.

Material and Methods

The study material would be humongous, should the author decide to meticulously browse through referrals and summaries and calculate the percentage of unwarranted scans being performed. This would require a lot of time which should rather be devoted to regular scientific or clinical work.

Results

As every day at the console – no exceptions! – brings up new cases of unwarranted studies, the estimated

percentage of such referrals should be expressed by a two-digit number, probably at least as high as reported by Lehnert and Bree [2], i.e. 23%. Table 1 lists the most absurd referrals for MRI scans as remembered by the author.

Discussion

In the paper cited in the introduction to this article, the percentage of unwarranted studies was 7% (this should be considered a very good result, considering the fact that several years earlier, the same authors claimed that as much as 30% CT of scans in patients below the age of 35 were unwarranted [3]). The Finnish authors selected 150 MRI scans out of 11,836 scans performed in 2007 at their site and assessed the appropriateness of examinations. The scans included 30 abdominal scans, 30 lumbar/sacral spine scans, 30 knee scans, 30 brain scans and 30 pediatric brain scans performed under anesthesia. The last group was the only one with no unwarranted examinations identified. This, however, may not be said with regard to examinations performed in Poland, as scans acquired under anesthesia in children include examinations due to isolated headaches or follow-up examinations of venous hemangiomas, although these are not indications for MRI scans [4]; similarly, it is not necessary to follow-up asymptomatic pineal cysts in adults [5] (Figure 1A, 1B). Venous hemangiomas, pineal cysts, arachnoid cysts and meningiomas are

Table 1. Most absurd rationales for referrals for MRI scans.

Referral rationale	Author's comment
"Pineal cyst – follow-up"	In the most absurd case, fourth follow-up scan of a cyst 9 mm in diameter, year after year
"Headaches – obs."	In the most absurd case, heading reading "Cito!" and further "Headaches for 20 years"
"Meningioma – follow up"	In the most absurd case, third follow-up scan of a meningioma 8×5×5 mm in size, year after year
"Venous hemangioma – follow-up"	In the most absurd case, fifth follow-up scan
"Epilepsy. Significant mental impairment. Arachnoid cyst – follow-up"	Fourth follow-up scan preformed year after year in a child currently 8 years old, each time under general anesthesia
"Head MRI scan with contrast. General fatigue – diagnostics"	Hopeless
"Discopathy" or "spinal pain", with no radicular components, no neurological symptoms, no X-ray or normal X-ray or X-ray with dramatic discopathy	In the most absurd case, follow-up scan 6 months after the first one in a 89-year-old patient
"Examination of Th and L-S segments. Suspected hemangioma at Th12. Urgent! "	Patient aged 80. X-rays with evident hemangioma without fractures
"Examination of L-S spine with contrast, assessment of sacral bone foci – hemangiomas?"	Follow-up ordered by a neurologist 6 months after previous scan in a 35-year-old patient. In the previous scan, radiologist described no focal lesions within sacral bone, as the image showed only physiological fatty conversion
"Examination of L-S spine with contrast – filum terminale lipoma, follow-up"	Hopeless
"Angiomyolipoma of left kidney – follow-up"	AML and hemangioma within the liver diagnosed by ultrasound, confirmed by CT, then in MRI and followed up by ultrasound – no progression. The follow-up scan was commissioned one year after the first one
"Suspected inflammatory/neoplastic lesions within pelvis minor organs: urinary bladder? prostate? terminal segment of the intestine? Neuralgia-like pain in thighs and groin"	Patient aged 33. No pelvic ultrasound scan (or CT) had been performed, patient had not been consulted by other specialists (the referral was made out by a neurologist following CT and MRI scans of L-S spine, both unremarkable)
"Examination of buttocks in search for sciatic nerve branch damage due to earlier iron injections"	Several (at least 5) examinations of this type had been performed before, to no effect
"Degenerative lesions of knees"	In the most absurd case, in a 87-year-old patient
"Examination of distal arm segment. Subcutaneous nodules" (the "Diagnosis" section reads: "Shoulder impingement syndrome")	No ultrasound scan had been performed; arm with large cellulitis-type lesions; the patient herself did not know what nodules the physicians referred to. Following an attempt to contact the referring physician (unavailable), examination was declined (shoulder examination was performed pursuant to another referral submitted by the patient)

common incidental findings in the increasingly frequently performed neuroimaging studies, and the follow-up of these lesions leads up to a vicious circle: we are detecting increasing numbers of clinically insignificant abnormalities for follow-up, and the number of examinations is constantly growing. For example, due to the increasing incidence of detected meningiomas, numerous analyses were performed to determine the natural history of these lesions; the analyses revealed that more stringent follow-up is indicated in patients before the age of 60 and patients with meningiomas that are hyperintense in T2-weighted images, contain no calcifications, are more than 25 mm in size and cause

swelling of surrounding brain tissue [6]. Thus, there is no rationale for annual MRI follow-ups of meningiomas several millimeters in size (Figure 2A–2C).

In the already-mentioned article by Lehnert and Bree, who found that as much as 23% of MRI scans were unwarranted, the referrals were made by primary care physicians [2]. This can not justify unwarranted studies in Poland, as the National Health Fund had deprived primary care physicians of the right to make out MRI referrals; these may be made out only by the so-called specialists. The term "so-called" is fully justified as family medicine is also a medical specialization.

Figure 1. Fourth follow-up (i.e. fifth overall) scan of pineal cyst with the maximum dimension of 9 mm in sagittal (A) and transverse (B) planes.

What expectations should make a specialist eligible to make out MRI referrals refer an 89-year-old patient with the diagnosis of “L-S spine pain” (which implies that the patient suffers only pain, with no radicular components and no negative symptoms that might require intervention)? Probably, he/she should expect no more than the following:

“Examination revealed multi-level advanced degenerative lesions of intervertebral discs.

Multi-level advanced degenerative and proliferative lesions at vertebral body edges (accompanied by disc protruberances) and within intervertebral joints cause multi-level compression on the the dural sac as well as stenosis of lateral recesses and intervertebral *foramina*.

Figure 2. Third follow-up (i.e. fourth overall) scan of a meningioma sized 8×5×5 mm, bound to cerebellar tentorium on the right, barely visible following administration of gadolinium in axial (A), sagittal (B) and coronal (C) planes.

Compression of spinal nerve roots in intervertebral foramina bilaterally at Th11/12, Th12/L1, L1/L2, L3/L4, L4/L5, L5/S1 and in the left *foramina* at L2/L3.

Root compression in lateral recesses at L1/L2, L2/L3, right recess at L3/L4, L4/L5, left recess at L5/S1."

What can be expected from a follow-up scan 6 months later? The question should be considered a rhetorical one.

In line with European guidelines [7], chronic headaches are also not an indication for routine neuroimaging examinations, as confirmed e.g. by results obtained at Author's site [8].

For sure, one should keep in mind that clinicians are concerned about potential legal consequences of refusal to make out a referral, particularly in face of increasingly demanding attitude of patients. Perhaps the pre- and post-graduate education curriculum should include classes in law and assertiveness...

I would like to warn my Colleagues against submitting to the temptation of feeling easy satisfaction of having to perform an easily reportable scan for the same payment

as they would receive for a more difficult and a really necessary one. The National Health Fund would pay for such scans to our employers, and thus, indirectly, to us, from our own taxes; also, it is us and our close ones who may in future face the Fund lacking money for non-standard chemotherapy or other specialist treatment...

Conclusions

1. Delayed terms of appointments, despite numerous facilities being available in Poland, are largely due to the unwarranted referrals of patients to MRI examinations, which makes the patients who truly require them wait very long or decide to pay for the examination out of their own pockets.
2. Radiologists should get involved in the fight against unwarranted studies, even through the use of such expressions as "anatomical variant", "does not require further inspection", "no clinical significance", "MRI is not the first study in the diagnostic algorithm" in warranted cases.
3. And by contacting the referring physician (in agreement with the head of the unit/department) to politely explain the absurdity of referral and refuse the test in the most absurd cases.

References:

1. Oikarinen H, Karttunen A, Pääkkö E et al: Survey of inappropriate use of magnetic resonance imaging. *Insights Imaging*, 2013; 4(5): 729-33
2. Lehnert BE, Bree RL: Analysis of appropriateness of outpatient CT and MRI referred from primary care clinics at an academic medical center: how critical is the need for improved decision support? *J Am Coll Radiol*, 2010;7: 192-97
3. Oikarinen H, Meriläinen S, Pääkkö E et al: Tervonen O. Unjustified CT examinations in young patients. *Eur Radiol*, 2009; 19: 1161-65
4. Bekiesińska-Figatowska M: Badanie MR – jakie istotne patologie może pokazać u dzieci z bólami głowy? *Med Wieku Rozwoj*, 2014; in press [in Polish]
5. Al-Holou WN, Terman SW, Kilburg C et al: Prevalence and natural history of pineal cysts in adults. *J Neurosurg*, 2011; 115: 1106-14
6. Oya S, Kim SH, Sade B, Lee JH: The natural history of intracranial meningiomas. *J Neurosurg*, 2011; 114: 1250-56
7. Radiation Protection 118. Referral guidelines for imaging (2001) Office for Official Publications of the European Communities, Luxembourg http://ec.europa.eu/energy/nuclear/radioprotection/publication/doc/118_en.pdf
8. Duczkowska A, Duczkowski M, Romaniuk-Doroszewska A et al: Wartość badań neuroobrazowych (MR i TK) w diagnostyce bólów głowy u dzieci i dorosłych – badania własne. *Med Wieku Rozwoj*, 2007; 11(3 Pt 1): 261-68 [in Polish]