Eur Arch Otorhinolaryngol (2003) 260 : 293–294
DOI 10.1007/s00405-002-0568-5

LETTER TO THE EDITOR

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Is magnetic resonance imaging still a contraindication in cochlear-implanted patients?

Received: 13 March 2002 / Accepted: 14 November 2002 / Published online: 16 January 2003
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Sir: Excessive magnetic and electromagnetic interference contraindicates magnetic resonance imaging (MRI) in subjects with cochlear implants, but, as more than 45,000 people worldwide already have cochlear implants, a substantial, and rapidly growing number will be needing MRI investigations for a variety of medical conditions. We present a highly instructive illustration of a routine clinical case where brain MRI was performed in a cochlear-implanted patient, despite the recommendations of the ENT physician provided to the patient several times, prior to and after surgery. A 35-year-old woman with a right cochlear implant (Nucleus, Cochlear Ltd.) developed clinical signs suggestive of encephalitis 3 years after implantation. Diagnostic MRI was proposed by the family doctor, but the patient, fully aware of the risk, warned the neuroradiologist that she could not undergo MRI because of her cochlear implant. The neuroradiologist decided MRI was essential for diagnosis and proceeded with the examination on a 1.5-T imager (Philips Medical Systems), convincing the patient the exploration would be safe. Encephalitis was confirmed and the patient was treated successfully. After the MRI exploration, conventional X-ray tomography confirmed the absence of implant and electrode displacement; the device was functioning correctly. MR images of the brain were unchanged, showing the known distorted darkening of the ipsilateral temporal cortex in the immediate vicinity of the implant. There were no changes in fitting data, and the patient continued to understand speech quite satisfactorily.

According to the consensus statement of the National Institutes of Health (1995), MRI should be performed in cochlear-implanted patients only if there is a strong medical indication; appropriate safety procedures must be applied. Potential problems with MRI include heating of the electromagnetic coil of the cochlear implant, induction of electrical current, damage to the implant by radiofrequency exposure, e.g., stimulator displacement, and heat-induced injury to adjacent tissue. Artifacts can also compromise image quality, leading to misinterpretation. Several authors have conducted in vitro experiments measuring torque, force, demagnetization, artifacts, induced voltages and temperature to determine MRI-cochlear implant compatibility [3, 5, 6, 7]. According to these in vitro results, cochlear implants remain in proper working order after a single MRI head scan provided the surgical attachment is correct, but the relative risk in implanted patients remains to be assessed. More largely, the same restrictions apply to MRI on the human head implanted with a middle-ear hearing prosthesis.

Implant manufacturers are redesigning their devices in response to an increasing demand for an MRI-compatible cochlear implant. Magnetless cochlear implants have been developed for patients with neurofibromatosis 2 (NF2), requiring regular MRI to monitor the response after surgical resection of bilateral vestibular schwannoma [4]. Such indications are very rare. A recent study of 30 patients with cochlear implants demonstrated a lack of adverse effects and useful imaging with 1.0 T FSE sequences [2]. In France, the magnets in MRI equipment most frequently used today are still in the 1.5 T range. Fewer than 2% of MRI machines installed in France operate at field strength lower than 0.5 T [1]. Although major dysfunction of magnet cochlear implants is a theoretically and experimentally rare event, any MRI-related complication would have important medico-legal consequences.

Our case demonstrates that even when appropriate and extensive information is given to the patient for standard MRI (1.5 T) contraindication after cochlear implantation, the decision of the neuroradiologist to perform the imaging on his own responsibility on a 1.5-T machine, without informing the ENT cochlear-implant specialist, can occur. The authors emphasize that in cochlear-implanted pa-

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tients, a close collaboration between the neuroradiologist and the ENT cochlear-implant specialist is mandatory. The decision must be a balanced one, based on proper knowledge of the potential risk for the cochlear implant weighed against the risk of not performing diagnostic MRI. Consensus between manufacturers, neuroradiologists and ENT specialists should be required before routine MRI explorations in cochlear implant patients.

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