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# USE OF THE 0.3-TESLA MRI MACHINE IN PAKISTAN FOR NEUROLOGICAL DISORDERS IN THE CURRENT ERA: A NECESSARY COMPROMISE OR A COUNTERPRODUCTIVE EXERCISE?

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Would you like to use a dial-up-internet connection to read this article?

Does using a Video Graphics Array (VGA) camera in the next family wedding sound like a good idea to you?

We are discussing a similar situation here.

Magnetic Resonance Imaging (MRI) is not a new technology, with the earliest documented clinical use in the early 1980s.<sup>1,2</sup> The basic principle has remained the same since then; applying magnetic field to a human body full of protons (Hydrogen ions) make the ions “spin” and then return to their original state; the MRI machine uses this phenomenon to generate detailed images. The strength of the magnetic field is expressed as the unit Tesla, higher the Tesla better the resulting details in the generated image.<sup>3</sup> The initial years saw rapid advances in this technology, with only a few years needed to progress the initial 0.05-Tesla machines to a much-improved 1.5-Tesla machine that became available in 1984.<sup>4</sup> The world has now moved on to 7-Tesla in clinical settings and 11.7-Tesla in research environments.<sup>5,6</sup>

Currently the best available MRI machines in Pakistan use the magnetic field strength of 3-Tesla.<sup>7,8</sup> It is difficult to find the 3-Tesla machines in Pakistan, but 1.5-Tesla machines are relatively more widely available, especially in the big cities. For a majority of neurological disorders, accurate depiction of the disease requires at least 1.5-Tesla machines.<sup>9,10</sup> The minimum that the neurologists worldwide think in terms of MRI strength is now 1.5-Tesla. The exception is Pakistan.

A large number of MRI centers in Pakistan are using 0.3-Tesla MRI machines. These machines are in use because they cost less initially as well as in maintenance. The patients also usually get cost benefit by relatively cheaper MRI rates with these machines. At what cost though?

A neurological disorder, like any other disorder, requires precision in diagnosis. One cannot treat what one doesn't diagnose. Many neurological disorders are diagnosed with only subtle signal changes within the neurological tissues and their surroundings.<sup>11-13</sup> A 0.3-Tesla MRI machine is simply incapable of detecting such abnormal signals. As a result, the diagnosis is either missed altogether or the patient needs to go through the higher Tesla MRI after already having a 0.3-Tesla MRI. The diagnosis gets late, and the cost gets higher. This negates the only utility of 0.3-Tesla MRI machine- cost effectiveness.

In the current scenario of 1.5-Tesla MRI machines being available mostly at a very high cost only in private centers in Pakistan, the solution is not straightforward. For instance, the only consistently available government-managed 1.5-Tesla MRI service in the huge city of Karachi is at Jinnah Postgraduate Medical Center. How can one center cater to the most populous city of the country with a population exceeding 20 million?<sup>14</sup> In the ever-deteriorating economic situation of the people, the neurologists find themselves compelled to turn to the cheaper 0.3-Tesla MRI options. Sometimes these work, at other times they end up costing even more (as already discussed). This creates a loop of supply, affordability and demand which is difficult to break.

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The author recommends the following solutions in this regard:

**1. Communication with government:**

The government needs to be informed about the need of good quality MRI for the health and safety of their people. The knowledgeable people (neurologists and radiologists) should hold meetings with the government officials and communicate the need for multiple easily accessible and affordable 1.5-Tesla MRI machines throughout the country.

**2. Measures to reduce cost at private centers:**

The private MRI centers providing 1.5-Tesla services to the patients should come forward to introduce measures to make it affordable to the masses. This may be achieved by the overall reduction in profit margins as well as making sure that there are good donation and zakat options for the patients in all these centers.

**3. Provision of “contrast if required” facility:**

Contrast agents cost a significant amount of money and that cost is transferred to the patient. These are important to diagnose neoplastic, infectious, demyelinating and inflammatory disorders. The prescribing doctors are sometimes not sure at the time of prescribing whether the patient would definitely need contrast agent, so they often end up prescribing contrast scan. To counter the resultant increase in cost, they refer the patients to the cheaper 0.3-Tesla MRI centers. The centers with 1.5-Tesla machines should make sure they have availability of qualified radiologist at all the times who may decide after seeing plain images if the patient requires contrast agents. This will encourage the physicians to prescribe the MRI with “contrast if required” instruction, knowing well that many times the patient would not be needing the contrast and therefore the cost would be reduced.

**4. Discussing the need of good quality MRI with the patients:**

Many times the doctors, especially the ones practicing in government hospitals, assume that all of their patients are non-affording. While this is true that almost none of those patients would like to waste their money, many times they do have enough resources to get the scan done at an appropriate place if they know the importance. It is important for the doctors to discuss the importance of 1.5-Tesla MRI scan with the patients and suggest ways how they can get that done with minimum possible cost.

**5. Judicious use of 0.3-Tesla MRI machines**

The changes suggested above cannot happen overnight. There are so many people with limited sources who require MRI scans that the neurologists may still consider suggesting 0.3-Tesla MRI scans in some cases. In the author’s experience, 0.3-Tesla MRI scans usually suffice in cases of back pains due to nerve root compressions secondary to disc herniation or vertebral misalignment. Another utility of 0.3-Tesla MRI scan may be when the neurologist just wants to “rule out” a pathology with no significant clinical evidence. A good question to ask to themselves is “how likely is that I will need to prescribe a 1.5-Tesla MRI scan after seeing the patient’s 0.3-Tesla MRI result”. If the answer is “unlikely or least likely”, then 0.3-Tesla MRI scans may still be used in the current scenario.

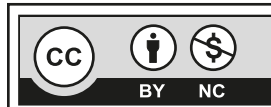
Making good decisions and acting timely are the keys to achieve one’s ambition. It is high time that the neurologists of the country make the provision of good quality MRI scans to the patients their ambition.

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