

# Study shows significantly improved MR image quality: A comparison of traditional positioning aids vs. Pearltec Multipad on uncooperative patients and patients with involuntary motion

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## Background

Repetitions of MR examinations due to motion artifacts cost time and money. A study based on 192 exams conducted by Andre et al. [1] found that 59% of the measured sequences had visible motion artifacts causing sequence repetitions on almost every fifth MRI patient examination. Andre et al. conclude, "greater attention and resources should be directed toward providing practical solutions to this dilemma". Therefore, an optimized positioning system for the patients is crucial. In this study conducted at Allegheny General Hospital the application of Pearltec's Multipad was compared with traditional positioning aids in brain MR examinations.



### Objective

To assess the impact of Pearltec's Multipad in comparison to traditional positioning aids with regard to image quality when performing MRI examinations on uncooperative patients and patients with involuntary motion.

#### Material and Methods

To analyze the potential elimination of motion artifacts, a user study was carried out at Allegheny General Hospital, Pittsburgh where brain MR exams were performed on uncooperative patients and patients with involuntary motion (n=22 subjects). First, exams were performed using traditional positioning aids. Next, exams were repeated using Pearltec's Multipad (Figure 1)

Exams were performed on either a Siemens Avanto or a Symphony MR system. Finally, Dr. Melanie Fukui, a specialist in neuroradiology and diagnostic radiology, rated the exams using a 5-tier scale designed to incorporate the impact of motion artifacts on diagnostic image quality. Ghosting artifacts, artifacts other than ghosting artifacts, sharpness of brain edge and image noise as well as the overall image quality were assessed.

#### Results

The study was conducted on 22 patients. Exams using traditional positioning aids resulted in images with moderate to severe artifacts where every fourth measurement was deemed non-diagnostic. On the other hand, exams using Pearltec's Multipad generated diagnosticquality images. Overall image quality increased from an average of 1.0 (moderate to severe artifacts) to an average of 3.0 (minimal image artifact). In 8 out of 22 patients, one of whom was an 83-year-old male patient, images obtained were deemed to be free of artifacts (Figure 2).

Overall, ghosting artifacts decreased in severity from 1.0 to 2.9. Artifacts other than ghosting artifacts decreased from 1.15 to 3.0; the sharpness of brain edge decreased from 1.05 to 3.2, and image noise was diminished from 1.0 to 3.1, where 0 corresponds to severe image artifacts and 4 to

## Conclusion

Motion artifacts are the most common cause of MR image degradation, particularly in the case of uncooperative patients and patients with involuntary motion. Exams using traditional positioning aids yielded images containing severe motion artifacts, which were deemed nondiagnostic. On the other hand, exams conducted using Pearltec's Multipad generated diagnostic- quality images, which were almost artifact-free. Pearltec's Multipad provides an opportunity to overcome motion artifacts, improve image quality and achieve a new standard of



Fig. 2: Image quality comparison on a brain scan of an 83-year-old male patient. First exam used conventional foam (left side), second exam used Pearltec's Multipad (right side).

 acquisition: Pearltec Multipad
artifact free
moderate artifacts
nondiagnostic
ghosting artifacts
other artifacts

acquisition: conventional foam

Fig. 3: Results showing near artifact-free images using Pearltec's Multipads.

1) Towards Quantifying the Prevalence, Severity, and Cost Associated With Patient Motion During Clinical MR Examinations. Andre, Jalal B. et al. Journal of the American College of Radiology, Volume 12, Issue 7, 689–695



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