CT Imaging for Trabecular Metal (TM) Interbody Grafting in the Cervical Spine

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Introduction

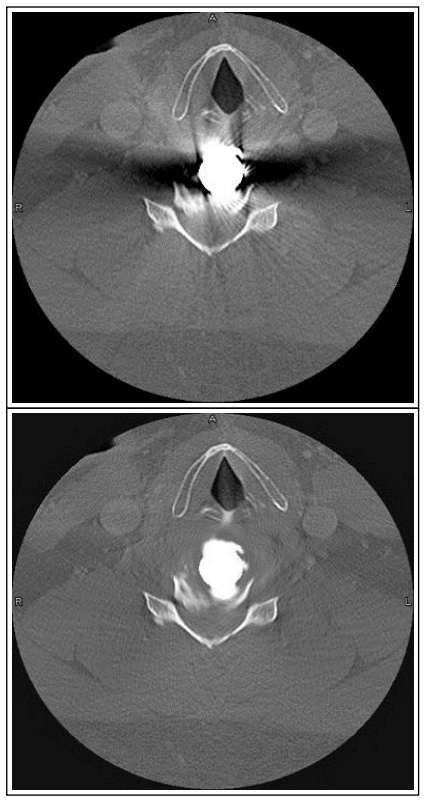
Proper vigilance for post-operative cervical spine fusion includes the patient-physician interaction and use of lateral cervical spine X-rays. When a measure of pre-operative symptoms persists or new complaints arise, CT scanning with supplemental contrast can lend a decisive hand in further treatment options. The sublimed admixture of Titanium and Tantalum metals, (Trabecular Metal, [TM],) creates scaffolding for interbody grafting. The artifactual considerations for TM are obviated using a contrasted enhanced CT methodology for assessment. Modification of current metal reduction techniques employing both single and dual energy are current industry standards for algorithm usage. Eliminating streak artifact following cervical metal implantable devices allow for more clear insights into post-operative fusion inculcation and adjacent level failures.

Methods

The radiologic procedure starts with a maximum anterior- posterior (MAP) reconstruction using an iterative algorithm and a multimodal projection based method. This produces an artifact-free constrained image which markedly reduces photon starvation, beam hardening and streak artifacts caused by metal in the body. The algorithm was validated on simulations, phantom and patient data, and compared with other metal artifact reduction algorithms. Ten patient models were reconfigured as routine follow-up over a two year periiod as an exercise to minimize streak artifact and better define anatomic clarity.

Illustrative Case

Axial Cervical CT Scanning



Conclusion

Spinal Trabecular Metal implants have facilitated an alternative mechanism to intervertebral body fusion with a number of biomedical advantages including porosity, coefficient of friction and mimicry of cancellous bone matrix.

One of the most well recognized disadvantages of evaluating implanted metal devices (especially titanium/tantalum alloys) is the coincidental artifactual spray which subsequently obscures diagnostic clarity. Thin cut CT Scanning with elongation of delivered energy and iterative time has afforded a more concise attenuation coefficient and notable erasure of artifactual disturbance. This allows for more precise visualization of bone-implant interface and discernment of fusion status.

Learning Objectives

1. Bone Metal Interface
2. CT Scanning for Post-Operative Assessment

References

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