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BRAIN AND SPINE 3 (2023) 102351 102516
THE T1 RATIO OF MARROW (TROM) AS A NOVEL TOOL TO IDENTIFY METASTATIC FROM NON-MALIGNANT MARROW LESIONS OF THE SPINE : A PILOT STUDY

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Introduction: The purpose of this study was to analyse quantitative values of normal and abnormal marrow on T1 weighted images of spine, to propose a ratio for T1 values of abnormal to normal vertebrae and to assess whether this ratio could be helpful in predicting presence of neoplastic lesions in the spine.
Materials and Methods: 100 randomly selected MRI scans of lumbar spine without any evidence of infection, fracture and tumour were selected to form a normal cohort. A second cohort of 100 metastasis of lumbar spine was identified. Ratio of T1 value of vertebral body to the T1 value of the inferior vertebral body was performed for normal cohort from T11 to L5. Ratio of T1 value of metastasis to adjacent normal vertebral body was calculated for metastatic cohort. Data was analysed using standard t-test and kappa was performed for intra and inter observer reliability.
Results: There was a statistically significant decrease in the T1 value of tumour in comparison to the normal vertebra (p=0.0001). A cut off decline in T1 value of abnormal to normal marrow to 0.6 and 0.7 was seen in patients with metastasis which was statistically significant. We call this the T1 Ratio Of Marrow(TROM). The sensitivity and accuracy with the cut-off value of 0.7 (92% sensitivity, 97.1% accuracy) is better than with 0.6 (75% sensitivity, 96.2% accuracy).
Conclusion: Using the TROM ratio on T1-weighted images can help increase sensitivity and confidence in differentiating neoplastic from non-neoplastic lesions of the spine without the need for additional advanced sequences.

000739
BRAIN AND SPINE 3 (2023) 102351 102517
18 MONTHS RESULTS OF A REINFORCED LUMBOPELVIC FIXATION TECHNIQUE

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Introduction: Lumbosacral fixation is a common procedure in primary and revision spine surgery but leads to high biomechanical stress on adjacent segments and the SIJ, resulting in implant failure such as breakage and loosening and pain. This frequently results in further surgery. For patients showing clinical and radiological signs of SIJ affection/arthrosis who fail conservative therapy, transarticular lumbopelvic fusion via the SIJ may be considered. The Bedrock™ technique has been described as a new option for reinforced lumbopelvic fixation, fusing the SIJ with additional triangular titanium implants, thereby reducing biomechanical loads off the S2AI screws. We share our experiences with 19 patients treated with this technique since January 2019.
Materials and Methods: 19 patients suffering from persisting low back pain (LBP) with indication for reinforced lumbopelvic fixation and SIJ fusion were treated with reinforced lumboplevic fixation with S2AI screw and a triangular titanium implant. 14 cases were revisions. All surgeries were carried out by a single surgeon at a orthopedic university hospital. Data was gathered retrospectively.
Results: From 1/2019 - 9/2021 19 patients (11f, 8m) were treated with reinforced lumbopelvic fixation and SIJ fusion with a mean follow up of 18,2 months. Mean age 68 years (range 62-78y). Preop. walking distance was reduced to an average <100 m. Standard treatment involved S2AI screws and triangular titanium implants (SIBone, iFuse 3D™). 14 revision cases split into 5 low grade infections with screw loosening, 3 cases with rod breakage, 5 cases of painful lumbopelvic screw prominence, 7 cases with proximal junctional kyphosis, 2 cases with misplaced implants, 8 cases of poor bone mineral density. 5 patients without prior spine surgery. All patients were treated bilaterally using freehand technique. Average implant length was 65 mm. There were no intraoperative or implant associated adverse events (AE) or serious adverse events (SAE). Postoperative imaging demonstrated good implant positioning and function. All patients regained walking ability for distances > 1000 m and were satisfied with the result. All patients reported significant reduction of SIJ pain.
Conclusion: We report results of 19 patients with a reinforced lumbopelvic fixation and fusion by S2AI screws augmented by one parallelly placed triangular titanium implant fusing the SIJ bilaterally with a mean follow-up of 18.2 months. Intra- and postoperatively we experienced no implant associated adverse event. Patients regained significant walking ability and significant reduction of SIJ pain. Radiologically no signs of implant loosening or failure were detected at the end of follow-up. Our results demonstrate a safe and efficacious surgical technique for reinforced lumbopelvic fixation with fusion of SIJ with significant improvement of the health care related quality of life. Further studies need to be conducted in order to obtain additional evidence.

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DO 3D PRINTED TEMPLATES AID IN EXPOSURE, IMPROVE THE ACCURACY AND SAFETY OF PEDICLE SCREW INSERTION IN COMPLEX SPINAL KYPHO-SCOLIOTIC DEFORMITIES? A COMPARATIVE COHORT STUDY

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Introduction: Surgical treatment of severe complex spinal deformities involves inherent difficulties such as anatomic anomalies, dysmorphic or absent pedicles, vertebral rotations and rib deformities. In India, these deformities are often neglected and present at a very late, much more deformed state when their treatment becomes even more challenging. Pre-operative imaging (including 3D reconstructed CT images) provide limited morphometric information, cannot show full scale spine and cannot be directly used on the operating table. Various techniques have been introduced to assure safe and accurate pedicle screw placement. One such promising and safe tool is 3D printed bone models and patient-specific drill templates. The purpose of this study is to evaluate the safety of 3D printed ABS thermoplastic bone models for meticulous exposure, freehand placement of pedicle screws and accuracy of patient-specific screw guides with pre-drawn, pre-validated trajectory in management of complex kypho-scoliotic deformity.
Materials and Methods: Of the 40 cases, 20 were operated with the help of 3D models/jigs [Fig1,2] and 20 were operated with free hand technique. Primary outcomes were measured in terms of screw violation, assessed by post op CT scan [Fig3] and secondary outcome were measured in terms of surgical time, blood loss, radiation exposure (no. of c-arm shoots required) and complications. Two-sample test of proportion for pedicle screw placement, T-test with equal variance for other parameters were statistically analyzed.
Results: The mean cobbs of the scoliotic curves were 98.1°±19.4°. Each group had matched 30% cases of Congenital scoliosis, 60% Adolescent Idiopathic Scoliosis, 10% post tubercular kyphosis [Fig4]. The exposure time was reduced significantly along with incidence of dural injury (p>0.05). 3D printed group over freehand group had significantly less medial violation, surgical time and fluoroscopic shots [Table 1]. There was no neurological deficit in any of the cases with no difference in the mean blood loss between the groups. We found significant (p=0.04) difference between 2 groups regarding perfect screw placement in favour of 3D printed jigs. There was no superior or inferior violation in any of our patients in either group. Mean Blood loss was higher in free hand group, however it was not statistically significant (p-value: 0.3). There were a total of 42 fluoroscopic shots required in 3D printing group (2.1/patient) while 113 fluoroscopic shots were obtained in freehand group, which was significantly higher.
Conclusion: The use of 3D printed models/ guides provided safe surgical dissection of the anatomic abnormality, statistically significant higher rate of accurate screw positioning and higher number of inserted screws, particularly at apical levels, providing more accurate morphometric information and facilitate surgical correction of complex severe spinal deformity.