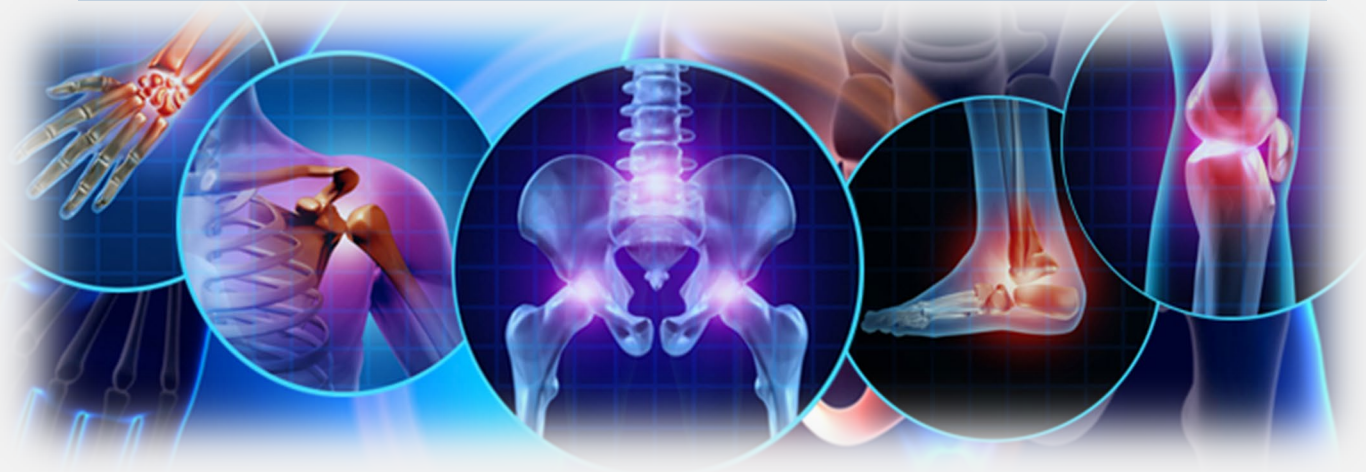
MICRO LABS LIMITED

ORTHO NEWSCAST



Volume 4|Issue 29|2023

Dear Doctor,

Greetings from Micro Labs. We are happy to bring you "**Ortho Newscast**" which contains latest and interesting news in the field of Orthopaedics.

This issue contains

1. Thoracolumbar spine fracture stabilisation by long versus short segments: A retrospective clinical and radiological study
2. Accuracy of computed tomography-navigation-based pedicle screw placement in fusion
3. Bone union affected in conservative treatment of adolescent lumbar spondylolysis
4. A Case Report on the MACI "Sandwich" Technique for a Large Osteochondritis Dissecans Lesion

Should you require any specific article or medical information, please feel free to contact us at medicalservices@microlabs.in

Looking forward to your valuable feedback

Best Regards,

Medical Team, Micro Labs Limited

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Volume 4| Issue 29|2023

Thoracolumbar spine fracture stabilisation by long versus short segments: A retrospective clinical and radiological study

Damage to the thoracic and/or lumbar area of the spine brought on by trauma or an outside force is known as a thoracolumbar spine injury (TLSI). The most typical location of spinal injuries is the thoracolumbar section.[1] In order to allow for early mobilisation, surgical stabilisation seeks to restore vertebral column stability, vertebral height, and rectify angular deformity. Surgery as a kind of treatment is still debatable. A typical strategy is the posterior method. Through a transpedicular technique, laminectomy, or ligamentotaxis, the spinal canal can be decompressed directly.[2] This study compares percutaneous short segment versus long segment stabilisation in this region using clinical and radiological characteristics.

The inclusion criteria comprised a single level of thoracolumbar fracture, eliminating osteoporosis, pathological fracture, pre-existing deformity or spinal surgery. Visual analogue scale (VAS), operating time, intraoperative blood loss, and postoperative duration of stay were clinical measures. Wedge angle and the ratio of the anterior to posterior vertebral heights were radiological measures.

There were 31 patients in the long segment group and 25 individuals in the short segment group (minimally invasive surgery (MIS)=14). Clinically, the short segment group had substantially improved VAS at 6 months (1 vs. 1.96; p=0.041), a shorter post-operative length of stay (16 days vs. 25 days; p=0.01), and less blood loss (178 ml vs. 824 ml; p<0.01). The short segment group had a radiologically superior wedge angle at both the immediate (5° vs. 9.23°; p=0.002) and long-term (7.41° vs. 11.43°; p=0.01) follow-ups. Additionally, the anterior and posterior vertebral height ratios following surgery are noticeably improved in the short segment group. The MIS group demonstrated considerably decreased blood loss within the short segment group (82 ml vs. 303 ml; p 0.01). Radiological factors, however, favoured the open group.

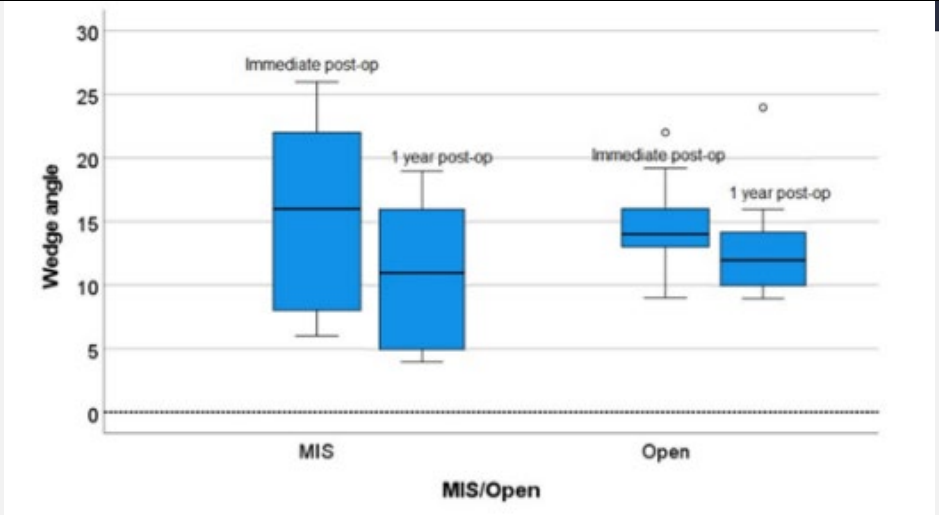

Figure 1: Box plot of the absolute change in (left) minimal invasive surgery (MIS; right) open in wedge angle between immediate post-op and 1 year post-op. O: outlier.

In a non-ankylosed spine, a recent assessment in 2020 found posterior segment instrumentation to be adequate for practically all type A and B fractures. Kyphosis may sometimes return, although the clinical implant is quite small. A further point made by the author is that index-level screws, which are placed in the fractured vertebra, improve the performance of short segment instrumentation and significantly lower the implant failure rate.[3] This study's limitations include a limited sample size, an intraobserver error, and poor x-ray quality. The measurement might be impacted by the fact that the injury level was not always in the middle of the x-ray beam. As a result, AVH and PVH ratios were used to increase the radiological measurement's precision.

Both lengthy and short stabilisations were successful in decreasing and stabilising a single-level thoracolumbar fracture. However, the short segment group's performance was noticeably better. Additionally, a less invasive procedure for short segment stabilisation demonstrated even less blood loss but less ideal radiological outcomes. Therefore, for traumatic thoracolumbar spine fractures, short segment stabilisation may be the preferred course of action

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Accuracy of computed tomography-navigation-based pedicle screw placement in fusion.

A novel lumbar interbody fusion procedure that used a transforaminal approach to reach the disc space was originally reported by Harms and Rolinger in 1982. The "transforaminal lumbar interbody fusion" (TLIF) method made interbody fusions less invasive by avoiding retraction of the thecal sac and nerve root. This reduced the likelihood of complications.[1] The Dynamic Reference Frame (DRF) is a crucial element that keeps the virtual data obtained by intraoperative 3D Computed Tomography (CT) scan in sync with the actual anatomical position in order to preserve the navigation system's accuracy.[2] In this study, bone fixed and skin fixed dynamic reference frames (DRF) were compared for accuracy of intra-operative navigation-assisted percutaneous pedicle screw insertion in minimally invasive transforaminal lumbar interbody fusion (MIS-TLIF).

This study comprised patients who had MIS-TLIF with DRF fixed either on bone (group B) or skin (group S). Intra-operative cone-bean computed tomography (cbCT)-based navigation was used to place pedicle screws. A last intra-operative cbCT Spin was used to rapidly verify the accuracy of the pedicle screw placement.

Of 170 patients, 91 patients were in group B and 79 patients were in group S. 364 screws (group B) and 316 screws (group S) were installed out of a total of 680 screws. There was no statistically significant difference in the distribution of screws or the patient's demographic information. The accuracy (94.5% in group B and 94.3% in group S) did not significantly differ between the two groups (Table 1 & 2)

Table 1: Screw Evaluation in Bone Fixed DRF (Group B)

Grade	L3	L4	L5	S1	Total	%
0	4	115	167	58	344	94.5
1	0	9	11	0	20	5.49
2	0	0	0	0	0	0
3	0	0	0	0	0	0
Total	4	124	178	58	364	100

Table 2: Screw Evaluation in Bone Fixed DRF (Group B)

Grade	L3	L4	L5	S1	Total	%
0	8	104	140	46	298	94.30
1	0	7	9	0	16	5.06
2	0	1	1	0	2	0.63
3	0	0	0	0	0	0
Total	8	112	150	46	316	100

The DRF was put on the skin in this investigation around 2-3 levels above the fusion level. A second skin incision is not necessary since the DRF is fastened non-invasively and away from the surgical field using non-absorbable sutures and sterile adhesive tapes. The streak artefact of the tracker in the intraoperatively obtained pictures was avoided by positioning the DRF away from the surgical site. The study's non-prominent DRF had the benefit of not interfering with the movement of the surgical instruments, notably at the L5-S1 level, without losing precision.[2] In this investigation, the skin-fixed group, the screw accuracy was shown to be 94.3%. This was in line with previous recent articles indicating skin-fixed DRF accuracy ranges of 93–95.6%.[3]

Using intra-operative CT guided navigation in MIS TLIF, skin fixed DRF can be used as an alternative method of implantation and avoids making an additional incision with precision comparable to that of bone fixed DRF.

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Bone union affected in conservative treatment of adolescent lumbar spondylolysis

One of the major causes of low back pain is lumbar spondylolysis, which is defined as a bone discontinuity or bone defect in the region where the lumbar spine's upper and lower articular and transverse processes meet. In the general population, lumbar spondylolysis occurs between 6% and 8% of the time, but in those who participate in specific physical activities, it can occur up to 63% of the time.[1] Except for the stage of the lesion, the parameters that predict the patient's bone union rate at the first appointment are still debatable. A substantial number of patients and lesions were included as well as staging in accordance with current improvements in CT and MRI diagnostics as significant novelties in this study.[2] Through a multivariable analysis of a large enough sample size of patients and lesions, this study sought to investigate the variables influencing bone union in conservative therapy as well as recent developments in diagnostic imaging.

Patients diagnosed with lumbar spondylolysis who were high school age or younger (n=514) were examined in this retrospective analysis. Patients with acute fractures who had conservative therapy after magnetic resonance imaging revealed signal alterations

around the pedicle were included. At the first appointment, the patient's age, sex, lesion level, major side stage, presence and stage of the contralateral side lesion, and existence of spina bifda occulta were all examined. Through a multivariable analysis, the relationship between each component and bone union was assessed.

This research comprised 298 lesions in 217 individuals (174 males and 43 girls; mean age: 14.3 years). The major side progressive stage was more likely to be related with nonunion than the pre-lysis and early phases, according to a multivariable logistic regression analysis of all covariates (OR: 5.86; 95% confidence interval [CI]: 2.00-18.8; p=0.0011). In terms of the terminal stage on the contralateral side, nonunion was more likely to be linked to it.

Table 1: Multivariable logistic regression analysis of each factor

	Reference	**OR**	**95% CI**	**p**
Sex				
Female	Male	0.6	0.22-1.55	0.30
Age				
> 13 years	< 13 years	0,73	0.31-1.72	0,47
Level of lesion				
L5	Non-L5 (L2-L4)	1.15	0.53-2.54	0.72
Main side stage				
Early	Pre-lysis	1.55	0.57-4.52	0,39
Progressive	Pre-lysis	5.86	2.00-18.8	0.0011
	Early	3.77	1.72-8.46	0.0009
Contralateral side stage				
Pre-lysis	None	12.8	3.39-63.1	0.0001
Early	None	5.17	1.43-24.6	0.011
	Pre-lysis	0.40	0.13-1.25	0.11
Progressive	None	9.74	2.67-47.1	0.0004
	Pre-lysis	0.76	0.24-2.44	0.64
	Early	1.88	0.72-4.97	0,19
Terminal	None	52.7	14.2-264	< 0.0001
	Pre-lysis	4.12	1.27-14.2	0.018
	Early	10.2	3.66-30.9	< 0.0001
	Progressive	5.42	1.99-15.9	0.0008
Spina bifida occulta				
With	Without	1.50	0.74-3.08	0.26

The affected level of the lesion and stage, as well as other characteristics including the gap size of the lesion, lumbar lordosis, contralateral side stage, and impaired flexibility, have all been described in previous multivariable research on the conservative treatment of lumbar spondylolysis as being adverse for bone union. However, compared to previous research, the bone union rate in these trials was lower, ranging from 17 to 67%.[3]

In contrast to other studies, this study is innovative in that: Two types of lesions were excluded from this study: 1. patients with "pre-lysis stage" lesions, a newly described stage concept defined as a lesion with no fracture line on CT but a signal change on MRI, were

included; and 2. patients with main side terminal stage lesions, in which bone union is difficult or impossible to achieve based on previous studies.

The main and contralateral side phases were the elements impacting bone union in the conservative treatment of lumbar spondylolysis. The degree of the lesion, age, or spina bifda occulta showed no discernible effects on the union of the bones. The primary, progressive, and final phases on the opposing side were poor indicators of bone union.

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A Case Report on the MACI "Sandwich" Technique for a Large Osteochondritis Dissecans Lesion

According to traditional definitions, osteochondritis dissecans (OCD) is a localised, idiopathic modification of the subchondral bone that poses a danger of instability and disrupts the articular cartilage next to it, potentially leading to early osteoarthritis. Although it is generally accepted that the aetiology is multifaceted, a thorough knowledge of the cause is still missing, in part because it is challenging to examine OCD before the emergence of overt clinical symptoms.[1] In order to cure osteochondritis dissecans (OCD) lesions, Lars Peterson reported putting autologous periosteum above and below implanted chondrocytes with concurrent autologous bone grafting (ABG) up to the subchondral bone plate level. The "Sandwich" approach was the name given to this method (Figure 1).[2]

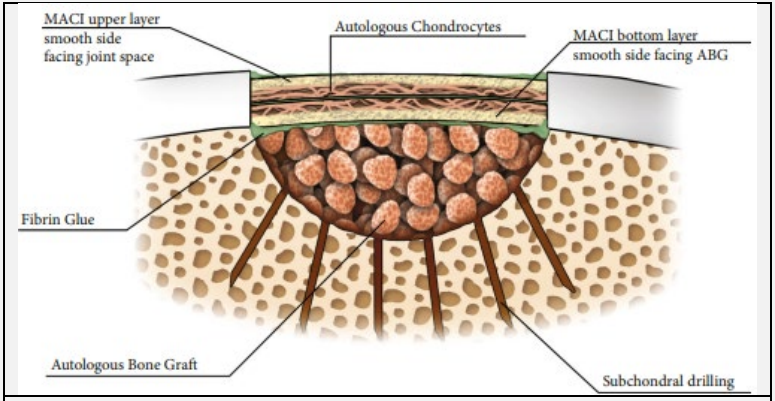

Figure 1: Bone graft is placed up to the subchondral plate level. Base drilled with 1.5 mm drill bit.

A 34-year-old man who was active and had bilateral symptomatic medial OCD lesions was seen. Femoral-tibial angles of 8° on the right and 3° on the left were seen on hip-to-ankle radiographs (Figure 2a). According to Merchant's observations, there was no patellofemoral involvement (Figure 2b). Figure 3 show a large, irregular OCD lesion with a necrotic femoral chondral fragment and medial tibial wear in the medial compartment. The choice to continue with the right knee MACI "Sandwich" approach with concurrent HTO followed by left knee surgery was decided based on the preoperative work-up, diagnostic arthroscopy, bone depth, and lesion size. This decision was taken to provide enough time for recuperation.

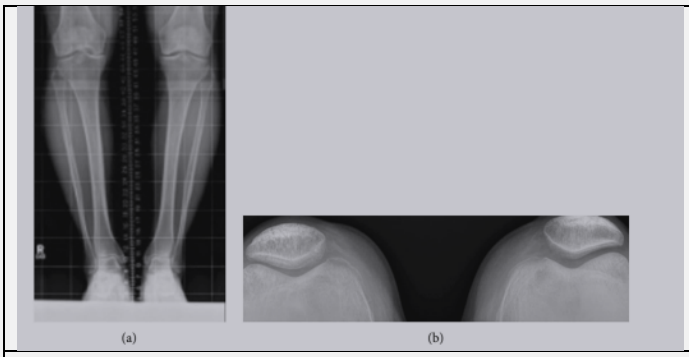

Figure 2: (a) Hip-to-ankle views. (b) Merchant's patellofemoral view

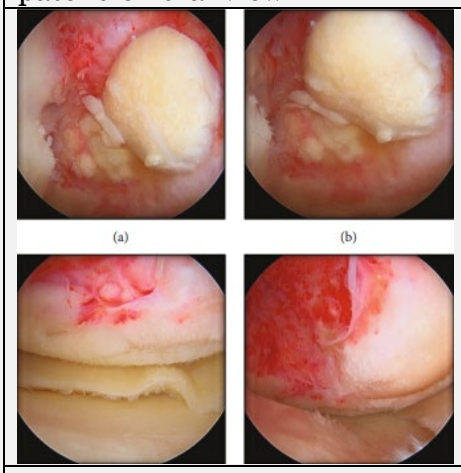

Figure 3: Arthroscopy.

Figure 4 show the HTO with a 10° correction and a 6 cm anteromedial subvastus approach that was used. To improve blood flow into the lesion, a 1.5 mm drill bit was used to drill the area in 3 mm increments. Bone was impacted into the defect up to the subchondral bone plate level, which was delineated by the previously constructed shelf, but not higher (Figure 5), using iliac crest ABG that was acquired. The intercondylar notch's poorly confined area was fitted with three absorbable micro-anchors. Using micro-anchors along the intercondylar notch area, the first graft was positioned with the smooth side facing the bone graft and stitched into place. The second graft was positioned with the cell layer facing the defect and stitched into place using the same sutures.

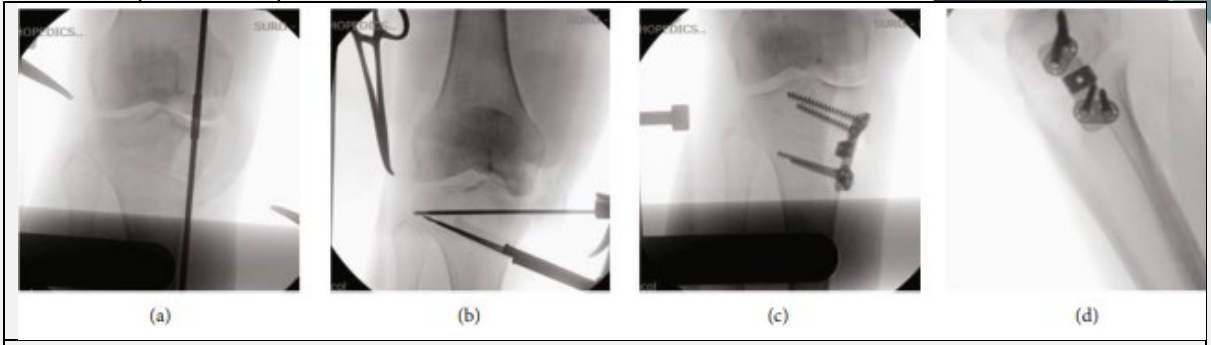

Figure 4: High tibial osteotomy X-rays. (a) Intra-operative mechanical axis. (b) Alignment HTO guide. (c) HTO fixation anterior view. (d)
HTO fixation lateral view.

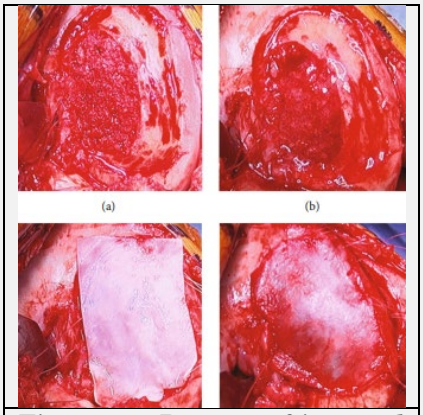

Figure 5: Bone grafting and first MACI stabilization

Figures 6 from post-operative radiographs at 3 and 6 months later show increased medial joint space, acceptable shape, fill, and bone integration.

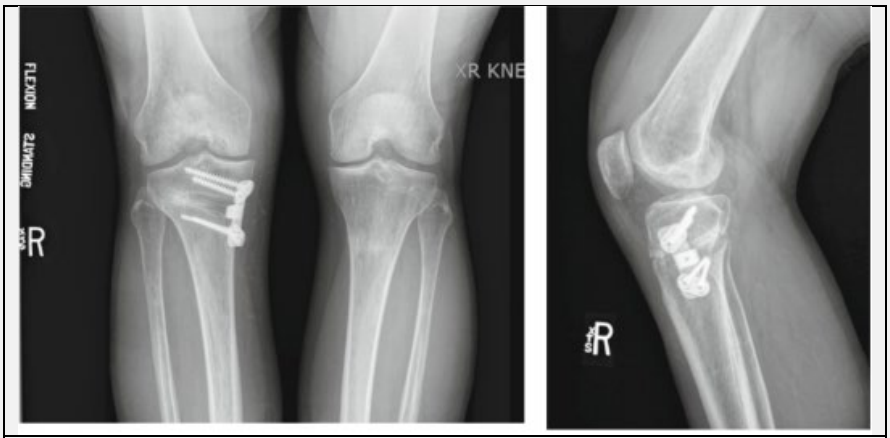

Figure 6: (a) 3-month post-operative posterior-anterior (PA) weight-bearing (WB) view. (b) 3-month post-operative lateral view.

Similar to the ACI "Sandwich" method, the MACI "Sandwich" operation with concurrent bone grafting and realignment surgery is successful. ABG can be taken from the iliac crest or proximal tibia and is recommended.[3]

Using a bilayer MACI "Sandwich" method, no other case has been previously documented that combines the intricacy of an HTO with an ABG to cure an OCD lesion and a sizable condylar defect. Post-operative Lysholm and IKDC scores at 9 and 13 months were considerably higher than pre-operative levels. At 9 and 13 months, all post-operative PROMs showed improvement, with KOOS ADL and Sports scores of 100. For active individuals who have significant poorly confined condylar lesions and bone involvement and present with malalignment, MACI paired with corrective osteotomy is a viable therapy option.

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