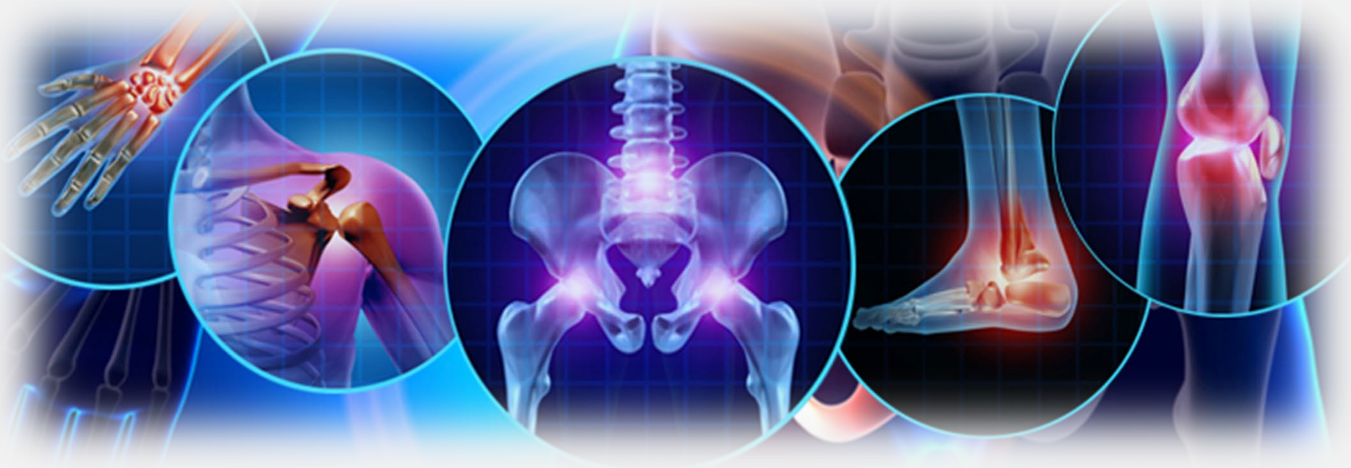
ORTHO NEWSCAST



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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

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Looking forward to your valuable feedback
Best Regards,
Medical Team, Micro Labs Limited

Treatment of Pauwels III femoral neck fracture: Femoral Neck System versus four cannulated screws

One of the most frequent types of fractures in clinical practise today is a femoral neck fracture, which accounts for 57% of hip fractures and 3.6% of total body fractures. One of the most widely used classification techniques for femoral neck fractures in clinical practise is the Pauwels classification for femoral neck fractures. Pauwels type III denotes a Pauwels angle greater than 50 degrees. Due to strong vertical shear forces, hip varus, collapse, and displacement of the proximal femur bone at the fractured ends, nonunion and disruption of the femoral head blood supply occur at both ends of the fracture, resulting in avascular necrosis.[1] Traditionally, three cannulated screws or a sliding hip screw (DHS) with an anti-rotation screw have been the major implantation materials used to treat femoral neck fractures. When treating a Pauwels III femoral neck fracture with three cannulated screws arranged in an inverse triangle. to assess the clinical effectiveness of the Femoral Neck System (FNS) in Pauwels III femoral neck fractures in comparison to four cannulated screws.[2]

Patients who received hospital treatment for a newly occurring type Pauwels III femoral neck fracture were included in this retrospective analysis. Patients either had FNS (n = 27) or four cannulated screws (n = 31 for the control group). The length of the procedure, blood loss, the length of time it took for the fracture to heal, the frequency of complications (such as short femoral neck, femoral head necrosis, fracture nonunion, and failure of internal fixation withdrawal), and the hip Harris score at the most recent follow-up were all examined.

There was no discernible difference between the two groups in terms of the length of the procedure, blood loss, or fracture healing time (all $P > 0.05$). Three and one patients in the FNS group, respectively, had femoral neck shortening and femoral head necrosis, but there were no fracture nonunions or pullout failures due to internal fixation failures. Seven, two, one, and two patients in the control group, respectively, had femoral neck shortening, femoral head necrosis, nonunion, and internal fixation failure. In the FNS and control groups, the cumulative complication incidence was 14.8% and 38.7%, respectively ($P = 0.042$) (Table 1). In the FNS and control groups, the hip Harris score at the most recent follow-up had excellent and good rates of 92.6% and 71.0%, respectively.

Table 1: Complications

Characteristics	FNS (n = 27)	Control (n = 31)	P
Short femoral neck	3 (11.1)	7 (22.6)	
Femoral head necrosis	1 (3.7)	2 (6.5)	
Nonunion	0	1 (3.20)	
Internal fixation withdrawal failure	0	2 (6.5)	
Total	4 (14.8%)	12 (38.7%)	0.042

Internal fixation and hip replacement are currently the main therapies for femoral neck fractures. According to widespread consensus, patients >80 years old with severe osteoporosis should opt for hip replacement surgery, whereas patients 65 years old should focus on anatomical reduction, rigid fixation, and hip joint preservation, especially if they engage in a lot of everyday activities. When choosing the course of treatment, it is important to take into account aspects besides age, including life expectancy, preoperative activity, systemic diseases, osteoporosis, and financial circumstances. 3 This study revealed that the incidence of short femoral neck, withdrawal of internal fixation, and femoral head necrosis were significantly lower in the FNS group while hip joint functions and hip Harris scores were significantly higher in the FNS group compared to the control group, indicating that the FNS could achieve better anti-vertical shear force biomechanics, as supported by recent studies.

According to the study, FNS was more clinically effective in treating Pauwels III type femoral neck fractures than internal fixation with four cannulated screws.

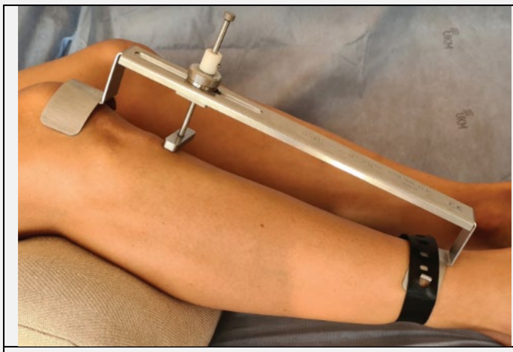
References

1. Gao Z, Wang M, Shen B, Chu X, Ruan D. Treatment of Pauwels type III femoral neck fracture with medial femoral neck support screw: a biomechanical and clinical study. Sci Rep. 2021 Nov 1;11(1):21418.
2. Lin H, Lai C, Zhou Z, Wang C, Yu X. Femoral Neck System vs. four cannulated screws in the treatment of Pauwels III femoral neck fracture. J Orthop Sci. 2022 Oct 10:S0949-2658(22)00246-9.
3. Lutnick E, Kang J, Freccero DM. Surgical Treatment of Femoral Neck Fractures: A Brief Review. Geriatrics (Basel). 2020 Apr 1;5(2):22.
4. Nibe Y, Matsumura T, Takahashi T, Kubo T, Matsumoto Y, Takeshita K. A comparison between the femoral neck system and other implants for elderly patients with femoral neck fracture: A preliminary report of a newly developed implant. J Orthop Sci. 2022 Jul;27(4):876-880.

A study on Knee Joint Laxity and Patient-Reported Outcomes After ACL Repair

The anterior cruciate ligament (ACL), which connects the lateral femoral condyle to the tibial plateau, is a crucial soft tissue stabiliser within the knee joint. The anterior cruciate ligament (ACL) is predominantly made up of a highly aligned, hierarchical, and fibrous collagen matrix, similar to other ligaments and tendons.[1] Over the past ten years, technological advancement has brought back anterior cruciate ligament (ACL) repair. The current study compared instrumented knee joint laxity and patient-reported outcomes (PROs) for acute isolated ACL tears following ACL repair with those after primary ACL reconstruction. At five years after surgery, it was predicted that ACL repair would produce similar knee joint stability and PROs to ACL reconstruction.[2]

A total of 85 patients with acute ACL tears were randomly assigned to receive either primary ACL reconstruction with a semitendinosus tendon autograft or ACL repair using dynamic intraligamentary stabilisation (DIS). The side-to-side differential in anterior tibial translation (DATT) measured by Rolimeter testing at 5 years after surgery served as the primary result. A follow-up exam was conducted after 1, 2, and 5 years. The International Knee Documentation Committee (IKDC) subjective score, Lysholm score, and Tegner activity scale were used to evaluate PROs. Recurrent instability, additional problems, and revision surgery rates were also noted. The Friedman test, Mann-Whitney U test, and Bonferroni correction were used for statistical comparisons, with significance set at P .05. A power analysis was performed beforehand.



A Rolimeter (Aircast) was used to assess instru- mented knee joint laxity with the knee in 30 of flexion.

Inclusion age was 27.1 6 11.5 years for the ACL reconstruction group and 28.3 6 11.5 years for the ACL repair group. 64 patients were available for follow-up at 5 years after surgery (ACL repair: n = 34 of 43 [79%]; ACL reconstruction: n = 30 of 42 [71%]). DATT was 1.7 6 1.6 mm in the group receiving ACL repair and 1.4 6 1.3 mm in the group receiving ACL reconstruction at 5 years (P =.334). Preinjury PROs were recovered as soon as one year after surgery and plateaued in both groups at two and five years after surgery. In the ACL repair group against the ACL reconstruction group, the mean Lysholm score was 97.0 6 5.4 compared 94.5 6 5.5 (P =.322), and the mean IKDC subjective score was 94.1 6 9.9 versus 89.9 6 7.8 (P =.047), respectively, at the 5-year follow-up. Twelve patients in the ACL repair group (35%; age 25 years: n = 10/12; Tegner score 7: n = 10/12) experienced recurrent instability at five years after surgery, and ten of them received single-stage revision ACL reconstruction. There were 6 patients in the ACL reconstruction group with recurrent instability (20%; age 25 years: n = 6/6; Tegner score 7: n = 5/6); nevertheless, staged revision was necessary in 5 individuals. Recurrent instability or ACL revision surgery differences between the two groups (P =.09 and.118, respectively) were not statistically significant. Age 25 years and a Tegner score of.7 were related to recurrent instability in both groups.

Table 1: Recurrent Instability at 5-Year Follow-upa

	No Recurrent	Instability	Recurrent	Instability
	Repair (n = 22)	Reconstruction (n = 24)	Repair (n = 12)	Reconstruction (n=6)
Age <25/>25 y	4/18	5/19	10/2	6/0
Tegner score <71>7	18/4	16/8	2/10	1/5
Tear location, proximal /midsubstance	21/1	20/4	10/2	4/2

With DATT 3 mm in both groups at 5 years postoperatively, instrumented knee joint laxity following ACL repair with DIS in the current RCT was comparable to that following ACL reconstruction. Without the inferiority of ACL repair, there were favourable PROs as early as 1 year after surgery that plateaued until 5 years postoperatively in both groups. 2 Overall, 3 prospective controlled level 1 trials contrasting ACL repair with DIS to ACL reconstruction have been published. These studies had follow-up periods up to 2 years postoperatively. However, only uncontrolled trials have been used to assess the mid- and long-term effects of ACL restoration using DIS. As a result, this study is the first prospective randomised trial to describe a 5-year follow-up following ACL reconstruction with DIS.[2,3]

Laxity and PROs of the instrumented knee joint were equivalent to those following ACL repair. In both groups, being young and having a lot of preinjury exercise were the primary risk factors for repeated instability. The current study encourages the use of ACL repair using DIS even if ACL reconstruction is still considered to be the gold standard.

References:

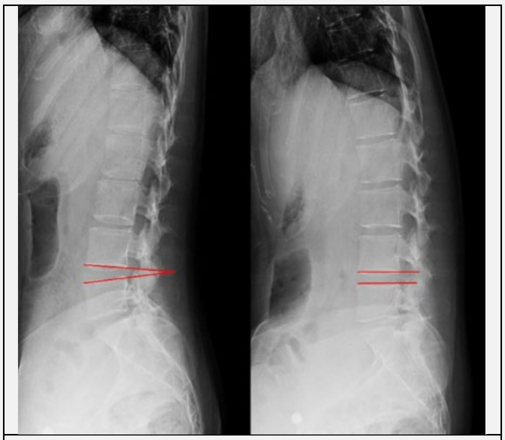
1. Scull G, Fisher MB, Brown AC. Fibrin-Based Biomaterial Systems to Enhance Anterior Cruciate Ligament Healing. Med Devices Sens. 2021 Feb;4(1):e10147.
2. Glasbrenner J, Raschke MJ, Kittl C, Herbst E, Peez C, Briese T, Michel PA, Herbort M, Kösters C, Schliemann B. Comparable Instrumented Knee Joint Laxity and Patient-Reported Outcomes After ACL Repair With Dynamic Intraligamentary Stabilization or ACL Reconstruction: 5-Year Results of a Randomized Controlled Trial. Am J Sports Med. 2022 Oct;50(12):3256-3264.
3. Ahmad SS, Schu¨ rholz K, Liechti EF, Hirschmann MT, Kohl S, Klenke FM. Seventy percent long-term survival of the repaired ACL after dynamic intraligamentary stabilization. Knee Surg Sports Traumatol Arthrosc. 2020;28(2):594-598.

Degenerative lumbar spinal stenosis patients and healthy individuals differ in age-related radiographic characteristics

When a vertebral canal, foramen, or lateral recess narrows, it is known as lumbar spinal stenosis. This condition manifests clinically as low back pain that may radiate to the buttocks and lower limbs and has well-defined causes for both the pain's onset and its relief, both of which are related to the compression of neurovascular structures within the lumbar canal. 1 To identify and examine relationships among age-related radiographic risk factors for degenerative lumbar spinal stenosis (DLSS). 2

This study included 180 instances in total, and lumbar magnetic resonance was carried out. Among them, a lumbar dynamic X-ray was investigated in 93 individuals that had DLSS. The intervertebral disc height (IDH), the ratio of IDH (IDHL4-5/L3-4), the initial IDH of L4-5 (iIDHL4-

5) in the DLSS group, disc degeneration (DD), cartilaginous endplate failure (CEF), Modic changes, the thickness of the ligamentum favum (LF), range of intervertebral motion (ROM), facet joint opening (FJO), facet joint angle (FJA), and the standard cross- Data from the two groups were compared, and potential DLSS risk variables were examined.


The measurement of intervertebral angle on fexion–extension radiographs

The DLSS group had greater iIDHL4-5 and higher IDH overall, with the exception of L4-5, as compared to the control group (P<0.05) (Table 1). CEF and the thickness of the LF at L1-S1 and the DD at L4-5 both showed significant differences (P< 0.05). The SCSA of the multifdus, erector spinae, and psoas major muscles were smaller in the DLSS group, although the FJA and FJO were higher (P<0.05). And when iIDHL4-510.73 mm, FJA52.03°, or FJO3.75 mm, the probability of DLSS rose. IDH showed a positive correlation (P<0.05) with SCSA of the multifdus and psoas major muscles as well as ROM at L1-S1. The SCSA of the multifdus and psoas muscles exhibited negative linear relationships with DD, while the CEF at L1-2, L2-3, and L5-S1 showed positive linear relationships (both P <0.05).

Table 1: Comparison of DD between the DLSS group and the control group

	The DLSS Group					The control group					P
	1	2	3	4	5	1	2	3	4	5	
L1-2	0	29	47	17	0	2	33	40	12	0	0.322
L2-3	0	25	45	21	2	0	28	44	15	0	0.394
L3-4	0	4	43	35	0	0	9	43	35	0	0.102
L4-5	0	1	24	66	2	2	5	42	38	0	0.001*
L5-S1	0	17	27	31	18	0	4	30	43	10	0,07

On the diseased segment, previous investigations looked into the relationship between IDH and other radiographic measures, but they did not go as thoroughly into the characteristics of the unaffected segment. In order to understand the overall radiographic differences between the DLSS and healthy persons, both diseased and non-diseased segments were measured in our investigation. This study discovered that IDH was significantly greater in the

DLSS group than in the control group in all lumbar segments other than L4-5, indicating that IDH in DLSS patients may be higher. The multifdus and psoas major muscles' atrophy was more pronounced in the DLSS group. Xia et al[2,3]

Larger initial disc height, excessive CEF, and atrophying paravertebral muscles can all cause DLSS by compromising the stability of the lumbar spine and promoting DD through increased intervertebral movement.

References:

1. Hennemann S, de Abreu MR. Degenerative Lumbar Spinal Stenosis. Rev Bras Ortop (Sao Paulo). 2021 Feb;56(1):9-17.
2. Li D, Wang L, Wang Z, Li C, Yuan S, Tian Y, Yu X, Liu X. Age-related radiographic parameters difference between the degenerative lumbar spinal stenosis patients and healthy people and correlation analysis. J Orthop Surg Res. 2022 Nov 3;17(1):475.
3. Xia G, Li X, Shang Y, Fu B, Jiang F, Liu H, Qiao Y. Correlation between severity of spinal stenosis and multifidus atrophy in degenerative lumbar spinal stenosis. BMC Musculoskelet Disord. 2021 Jun 12;22(1):536.

Internal fixing of a 180° malrotated humerus through derotational osteotomy

In the past, humeral shaft fractures have been treated non-operatively with functional bracing.1 Upper extremity function is primarily dependent on the hand's ability to reach a desired point in space. Humeral shaft fractures make up about 3% of all fractures and are associated with a bimodal distribution, with high energy fractures in young patients and low energy fractures in elderly patients. This research describes a case of a 180° rotational deformity that developed after a midshaft humeral fracture that had been treated nonoperatively and had caused the humerus to shorten, the shoulder's range of motion to be restricted, and the elbow to contract in the flexion position.2

In this paper, a case of 180° severe humeral rotational deformity following humeral shaft fracture is presented. The patient reported experiencing pain and had trouble performing regular tasks. She also thought the cosmetic disfigurement was unacceptable. She was looking for a surgical fix as a result. Internal fixation was done after derotational osteotomy of the humerus and neurolysis of the radial nerve. The patient experienced brief iatrogenic radial nerve palsy during surgery, but this was entirely resolved during postoperative follow-up(Figure 1 & 2). At the final 2-year follow-up, the Disabilities of the Arm, Shoulder, and Hand score decreased from 55 preoperatively to 16.

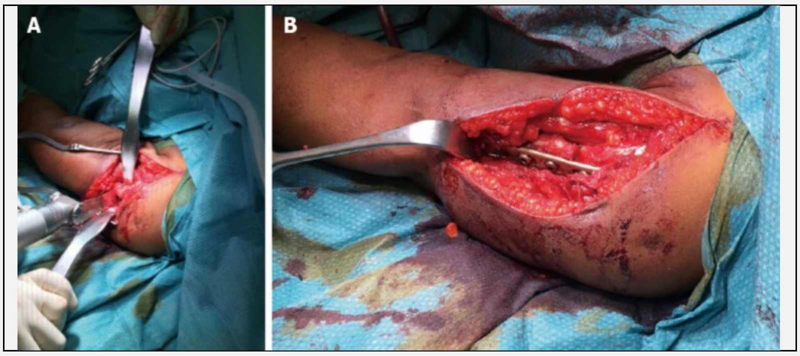


Fig. 1: A: Transversal osteotomy of the humerus was performed at the level of the former fracture; B: Internal fixation was done with the use of an eight-hole dynamic compression plate

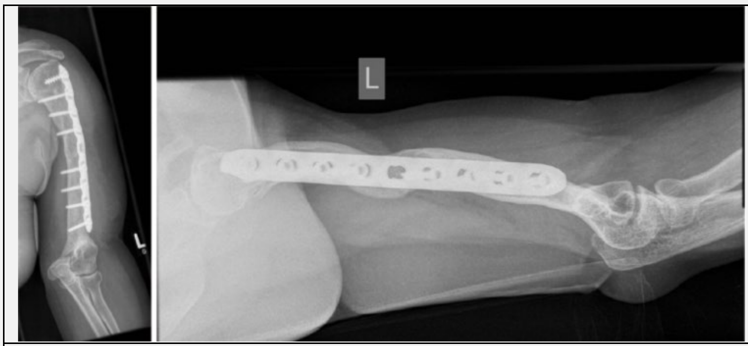


Fig. 2: X-rays at the patient's 2-year follow-up appointment.

Both the visually undesirable state of a 180° malrotated arm and the incapacity to carry out regular daily activities in this patient were causes for surgical surgery. The range of motion (ROM) of her left arm was likewise limited, and it hurt a lot to move her shoulder. In order to protect neural structures and blood flow, more severe deformity repairs are typically carried out as staged or continuous surgeries using external fixation.[3] For a number of reasons, we decided against surgical correction using an external fixator in this instance. On the one hand, the patient opted against using an Ilizarov fixator because of the significant aftercare required. We also required a speedy fix because we didn't know how long the patient would be in the region and available for follow-up and step-by-step correction.[2]

The anatomical and functional issues associated with significantly malrotated humeral shaft fractures can be improved with single-stage radial neurolysis, derotational osteotomy, and secure fixation.

References:

1. Kocialkowski C, Sheridan B. Humeral shaft fractures: how effective really is functional bracing? Shoulder Elbow. 2021 Oct;13(6):620-626.
2. Wenning KE, Schildhauer TA, Jones CB, Hoffmann MF. Derotational osteotomy and internal fixation of a 180° malrotated humerus: A case report. World J Orthop. 2022 Oct 18;13(10):940-948
3. Liu GY, Zhang CY, Wu HW. Comparison of initial nonoperative and operative management of radial nerve palsy associated with acute humeral shaft fractures. Orthopedics. 2012 Aug 1;35(8):702-8.