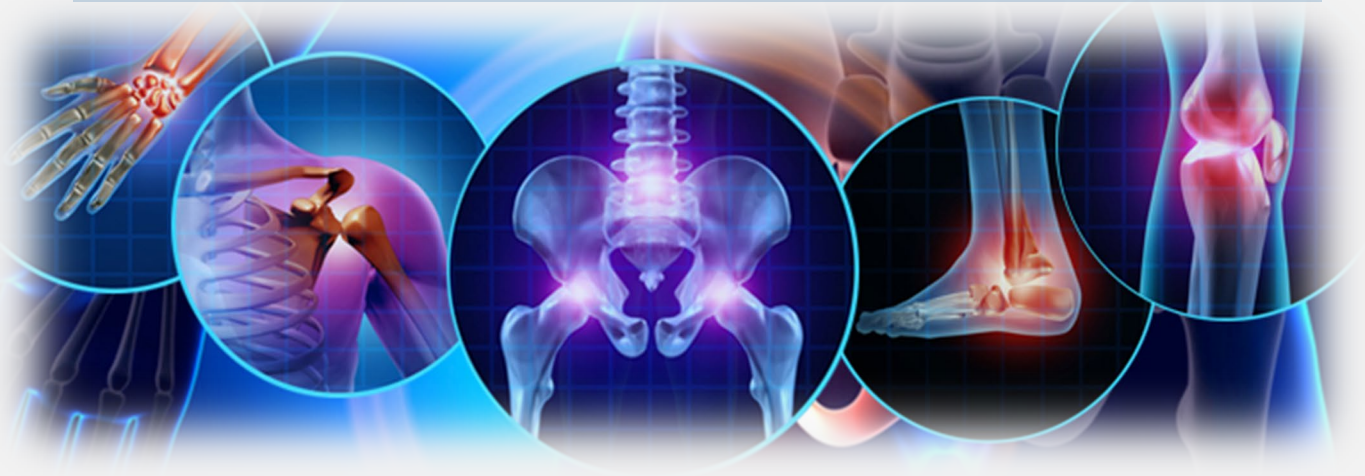


ORTHO NEWSCAST



Volume 3|Issue 21|2022

Dear Doctor,

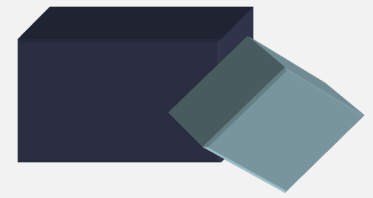
Greetings from Micro Labs. We are happy to bring you "Ortho Newscast" which contains latest and interesting news in the field of Orthopaedics.

This issue contains

1. A meta-analysis of computer-assisted guided technology versus traditional technology in unicompartmental knee arthroplasty.
2. Technical innovation and biomechanical investigation of cervical non-fusion employing biomimetic artificial disc and vertebra complex.
3. Case report and literature review of a periprosthetic joint infection caused by *Candida parapsilosis*.
4. A randomised controlled experiment comparing conventional and fast track rehabilitation following complete hip replacement.

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



1. A meta-analysis of computer-assisted guided technology versus traditional technology in unicompartmental knee arthroplasty

Background:

Knee osteoarthritis (OA) is one of the most frequent ailments in middle-aged and elderly persons, and it usually affects the medial compartment of the knee joint. The metal prosthesis of unilateral tibial plateau has been put into the afflicted joint compartment to treat OA since McKeever first suggested the concept of unicompartmental knee arthroplasty (UKA) in 1955. UKA had a significant failure rate at first.¹ Total knee arthroplasty (TKA) is a good option for advanced knee osteoarthritis (KOA)



that hasn't responded to other treatments. It was predicted that by 2030, 55 percent of working-age patients would be considered for TKA.² Since its debut, the use of computer navigation for TKA has continuously increased. This technology has not been widely adopted around the world. In certain countries, adoption has been more quick than in others. Despite overwhelming evidence that it greatly improves component alignment as compared to traditional TKA, computer-assisted TKA has yet to gain widespread acceptance.³ Though UKA is a beneficial method for treating knee osteoarthritis, the question of whether guided systems may provide better limb alignment and clinic results is still debated. A recent meta-analysis was undertaken to see if the guided system may produce better clinical and radiological outcomes when compared to traditional treatments.⁴

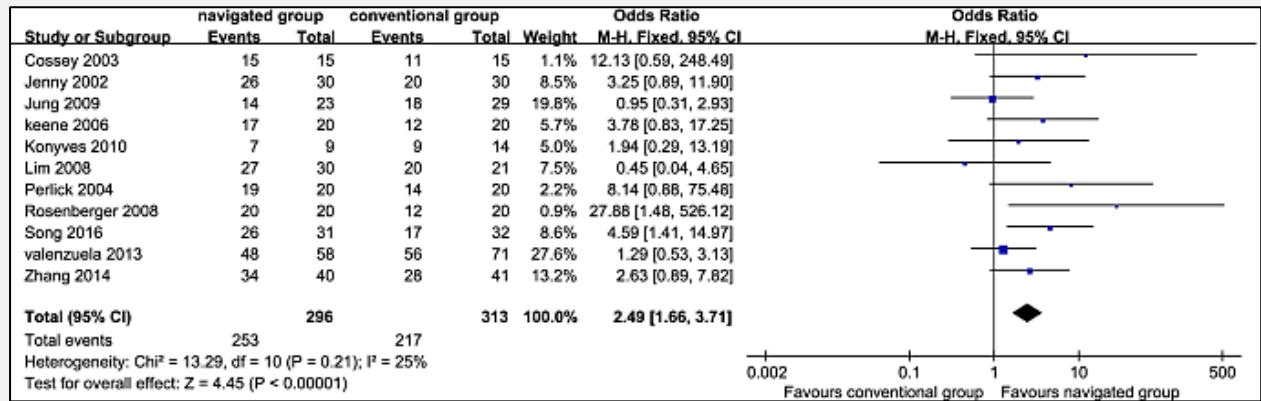
Methodology:

The following criteria were used to compile this report: (1) Studies compared computer-assisted UKA against traditional UKA. (2) There were no restrictions for pooling clinic or radiographic results. (3) Only English-language studies were accepted. Before May 2021, the researchers found studies in online databases such as Medline, Embase, the Cochrane Library, and Web of Science. The PRISMA principles were strictly followed in this report. Review Manager 5.4 was used to accomplish our research.

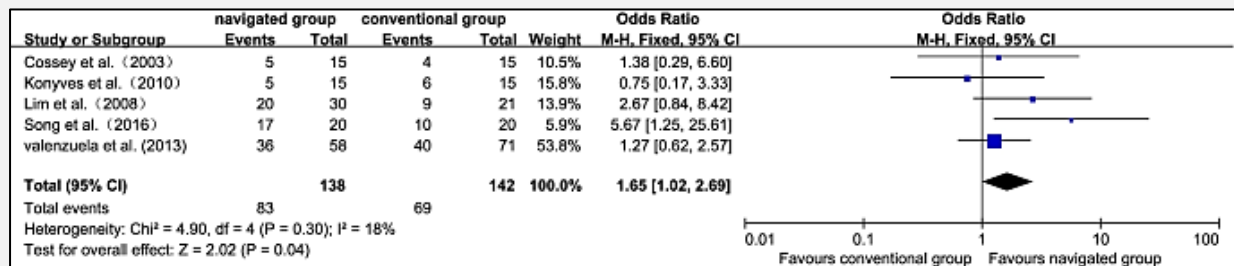
Results:

A total of 852 knees were studied in 14 papers. The navigated system had significantly better outcomes in inliers of mechanical axis (MA) ($P < 0.01$), MA in Kennedy's central zone (Zone C) ($P=0.04$), inliers of the coronal femoral component ($P < 0.01$), inliers of the coronal tibial component ($P=0.005$), inliers of the sagittal femoral component

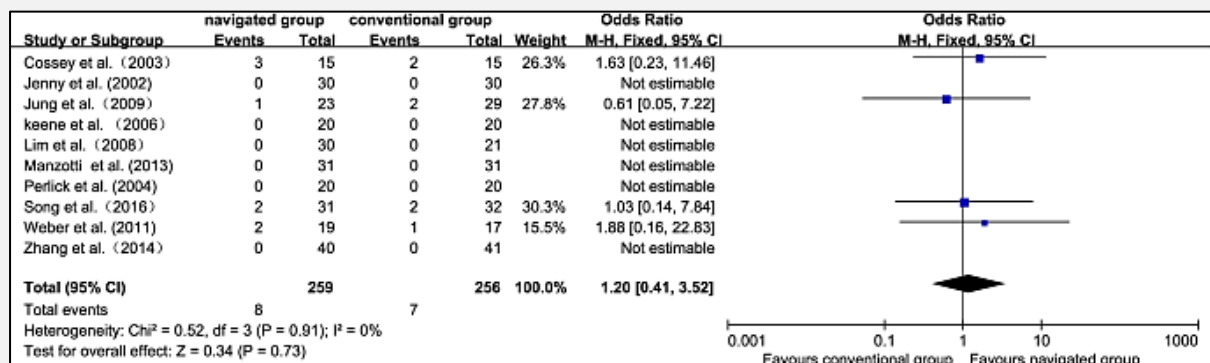
($P=0.002$), and Range of Motion (ROM) ($P=0.04$), according to Between these two groups, there were no significant differences in the Oxford Knee Score (OKS) ($P=0.15$), the American Knee Society Knee Score (KSS score) ($P=0.61$), or postoperative complications ($P=0.73$). In terms of operation time, the guided group took 10.63 minutes longer than the standard group.



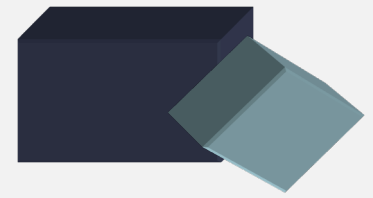
Forest plot diagram showing the mean difference in Oxford Knee Score (OKS score) between navigated group and conventional group



Forest plot diagram showing the mean difference in American Knee Society Knee Score (KSS score) between navigated group and conventional group



Forest plot diagram showing the proportion of coronal tibial component of satisfactory ranges between navigated group and conventional group



The use of the navigation system considerably enhanced the precision of reconstructing the MA and positioning components in UKA, according to the findings of this study. The navigation group's ROM was much better than the traditional group's in terms of clinical outcomes. Furthermore, as comparison to the traditional group, the guided group's operative time was 10.63 minutes longer. However, there was no discernible difference in the OKS, KSS, or complications scores.⁴ Computer-assisted UKA for treating medial tibiofemoral joint arthritis generates 5-year survival rates comparable to complete knee arthroplasty, according to Chowdhry M et al.⁵

According to the research, the guided system resulted in improved radiographic outcomes and no significant difference in the risk of complications when compared to traditional procedures, despite the greater surgery time. However, no significant changes in functional outcomes were discovered. Because the included trials had limited sample sizes and short follow-up periods, high-quality RCTs with large patient populations and adequate follow-up are needed to determine the guided system's long-term effects.

According to the research, the guided system resulted in improved radiographic outcomes and no significant difference in the risk of complications when compared to traditional procedures, despite the greater surgery time.

References

1. Wang B, Sun H, Fu Z, Kang J, Yu X. Application of unicompartmental knee arthroplasty in the treatment of knee osteoarthritis. *Arthroplasty*. 2021 Feb 15;3(1):12.
2. Jiao J, Tang H, Zhang S, Qu X, Yue B. The relationship between mental health/physical activity and pain/dysfunction in working-age patients with knee osteoarthritis being considered for total knee arthroplasty: a retrospective study. *Arthroplasty*. 2021 Jul 1;3(1):22.
3. Shah SM. After 25 years of computer-navigated total knee arthroplasty, where do we stand today? *Arthroplasty*. 2021 Nov 4;3(1):41.
4. Xu, K., Chen, Q., Yan, Q. et al. Comparison of computer-assisted navigated technology and conventional technology in unicompartmental knee arthroplasty: a meta-analysis. *J Orthop Surg Res*. 2022 Feb; 17, 123.
5. Chowdhry M, Khakha RS, Norris M, Kheiran A, Chauhan SK. Improved Survival of Computer-Assisted Unicompartmental Knee Arthroplasty: 252 Cases With a Minimum Follow-Up of 5 Years. *J Arthroplasty*. 2017 Apr;32(4):1132-1136.

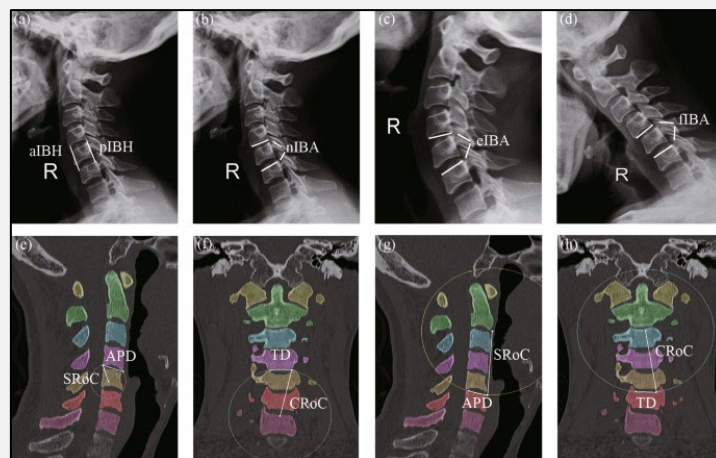
2. Technical innovation and biomechanical investigation of cervical non-fusion employing biomimetic artificial disc and vertebra complex.

Background:

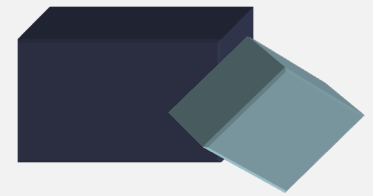
In recent years, non-fusion fixation of the cervical spine has become one of the options for treating adjacent vertebral illness (ASD). Motion-preserving treatment is an appealing alternative, particularly in the surgical treatment of long-column spinal disorders, because it minimises the incidence of ASD by providing both great stability and significant physiological movement of the spine.¹Traditional motion-preserving spinal prostheses have flaws in their construction. These devices have an excessively fat contact area with the vertebral endplate, resulting in a mismatch between the prosthesis and the endplate.²After vertebral fusion, changes in spinal motion are major factors that contribute to neighbouring vertebral illness (ASD). The motion-preserving prosthesis is an effective approach to lower the incidence of ASD as an implant for spinal non-fusion, but its shortcomings limit its clinical applicability. The purpose of this work is to develop a novel motion-preserving artificial cervical disc and vertebra complex with an anti-dislocation mechanism (MACDVC-AM) and test its effectiveness on the cervical spine.

Methods:

The MACDVC-AM was created using information from healthy individuals. The range of motion (ROM) and stress of adjacent discs were compared using the finite element intact model, fusion model, and MACDVC-AM model. The stability index ROM (SIROM) was calculated after biomechanical experiments were performed on fifteen cervical specimens.

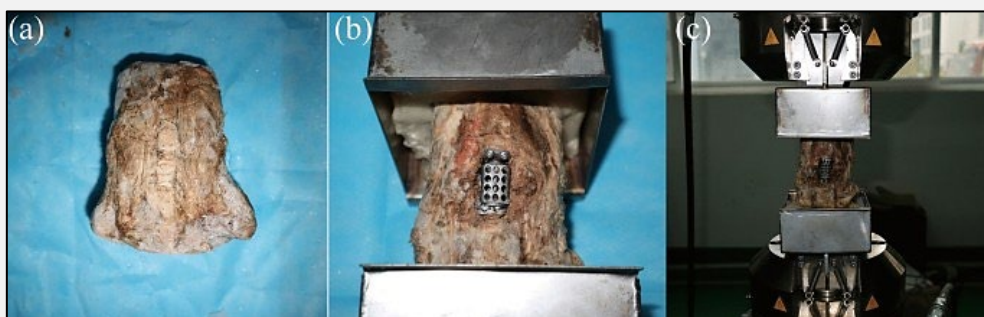


Measurement of parameters of C4–6 in the X-ray and CT images.

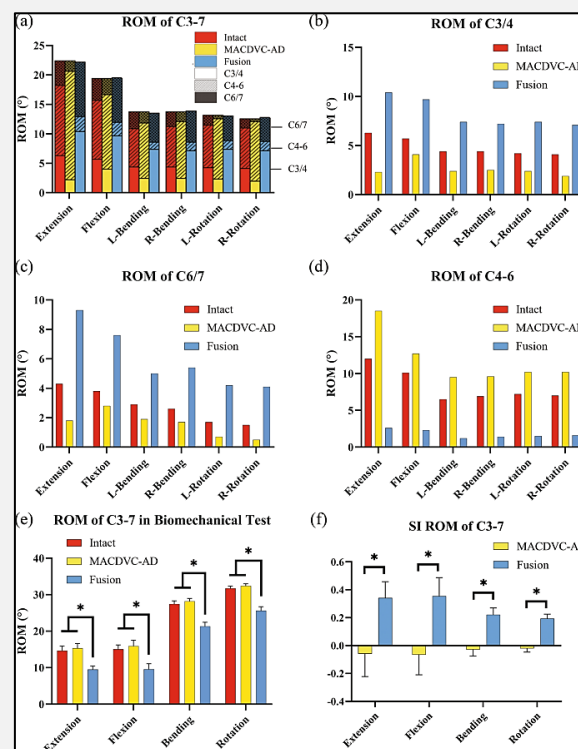


Results:

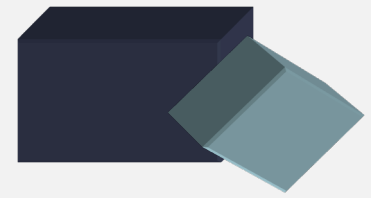
The MACDVC-AM model lowered intervertebral ROMs by 28–70% in neighbouring segments and raised them by 26–54% in operated segments when compared to the intact model's intervertebral ROMs, however the fusion model exhibited the reverse outcome. The MACDVC-AM model, in contrast to the fusion model, reduced the tension on nearby intervertebral discs. In biomechanical tests, the MACDVC-AM group did not differ significantly from the intact group's ROMs ($p>0.05$). The MACDVC-AM group's SI-ROM is negative but close to zero, and there was no significant difference between the intact and MACDVC-AM groups ($p>0.05$).



In vitro the MACDVC-AM implantation in human cervical spines.



Comparison of ROMs and SI-ROM in FE analysis and biomechanical tests.

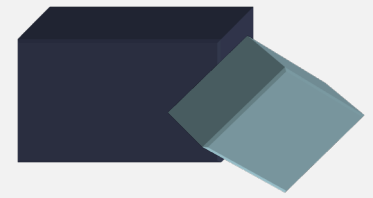


Researchers successfully constructed a MACDVCAM with enhanced structures, such as an anti-dislocation mechanism to prevent dislocation, appropriate nail channels to reduce front tissue pressure, and adequate bone graft space to increase long-term stability, among other things. Lastly, we discovered that MACDVC-AM not only maintained the physiological ROMs of the cervical spine but also reduced the stress changes of nearby IVDs, possibly contributing to the protection of adjacent IVDs, using FE analysis and biomechanical testing. Finally, we anticipate that the successful creation of MACDVC-AM and its benefits will encourage the development of novel motion-preserving prostheses.¹ Subsidence can result from a mismatch between the prostheses and the endplate, resulting in fixation loosening and reoperation. According to previous study, dome-shaped TMC can greatly prevent subsidence, and endplate matching can also enhance the maximum load by 53.8 percent.^{3,4} The study's limitations must be addressed. To minimise calculation burden, the morphology of the fixation system and bone graft were simplified, and these simplifications inevitably influenced the actual stress distribution.

The MACDVC-AM was designed successfully. The findings show that the MACDVC-AM can improve physiological mobility and stability, reduce neighbouring intervertebral compensatory motion, and reduce stress changes in adjacent discs, all of which help to protect adjacent discs and prevent ASD.

References:

1. Li, J., OuYang, P., He, X. et al. Cervical non-fusion using biomimetic artificial disc and vertebra complex: technical innovation and biomechanics analysis. *J Orthop Surg Res.* 2022; 17, 122.
2. Dong J, Lu M, Lu T, et al. Artificial disc and vertebra system: a novel motion preservation device for cervical spinal disease after vertebral corpectomy. *Clinics.* 2015;70:493–9.
3. Jang JW, Lee JK, Lee JH, Hur H, Kim TW, Kim SH. Effect of posterior subsidence on cervical alignment after anterior cervical corpectomy and reconstruction using titanium mesh cages in degenerative cervical disease. *J Clin Neurosci.* 2014;21:1779–85.
4. Lu T, Liang H, Liu C, Guo S, Zhang T, Yang B, He X. Effects of titanium mesh cage end structures on the compressive load at the endplate interface: a cadaveric biomechanical study. *Med Sci Monit.* 2017;23:2863–70.



3. Case report and literature review of a periprosthetic joint infection caused by *Candida parapsilosis*

Background:

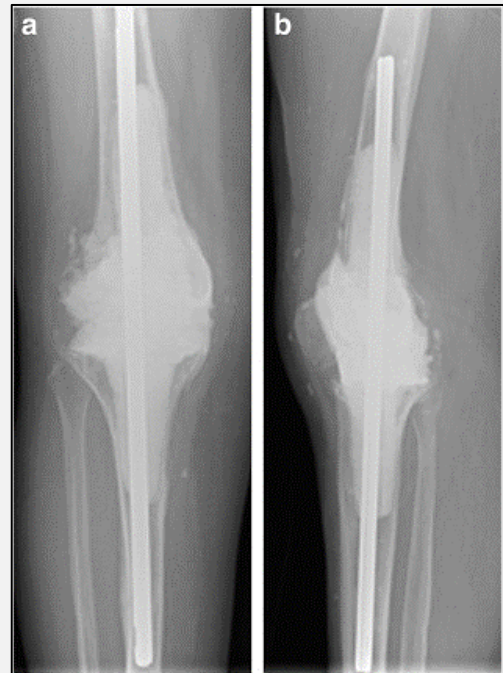
Periprosthetic joint infection (PJI) is one of the most serious problems that can occur after joint arthroplasty, adding to the patient's financial load and suffering. PJI is the major cause of total knee arthroplasty (TKA) failure and the third greatest cause of total hip arthroplasty failure (THA). PJI is known to occur in 1–3% of initial arthroplasty patients and 3–5% of revision arthroplasty patients. With longer life expectancy and a greater indication for primary joint arthroplasty, the number of PJI patients will more than double. Clinical decision-making and the development of effective preventative interventions are aided by early and precise identification of persons at high risk of PJI.¹ Currently, no defined management guidelines for fungal PJI have been developed. There have been reports of a wide range of surgical and antibacterial treatment procedures. This instance of *Candida parapsilosis* periprosthetic joint infection seen at the author's centre is described in this report.²



Periprosthetic Joint Infection

Case Presentation:

The patient, a 74-year-old woman, visited hospital with severe bilateral knee discomfort and was diagnosed with knee osteoarthritis. Eczema and hypertension were among her previous medical conditions. Due to prolonged knee pain, she had a total knee replacement on her right knee. A tiny amount of blood-stained discharge was seen over the proximal region of the surgical site during early follow-up on post-operative day 13. For culture, a wound swab was collected. The patient was also given an empirical course of cloxacillin. She suffered flare-ups of generalised skin rash as a result of her eczema history. Aside from that, the patient suffered syncope episodes. After further research, cortisol deficiency was discovered. The patient was prescribed glucocorticoid replacement treatment. She suffered iatrogenic Cushing syndrome as a result. *Candida* species were found in the wound swab culture of the discharge. Initially, it was thought to be contaminated. She developed a subcutaneous abscess around her right knee a year later. *Candida parapsilosis* infection was confirmed by aspiration and culture. Because she had first refused surgical



Post-operative x-ray right knee after 2-stage revision surgery.

treatment, the patient was treated conservatively with fluconazole. After that, the infection advanced to the creation of an abscess. Following that, a two-stage revision arthroplasty with cement spacer was performed. In addition, we looked at the research on fungal periprosthetic joint infection.

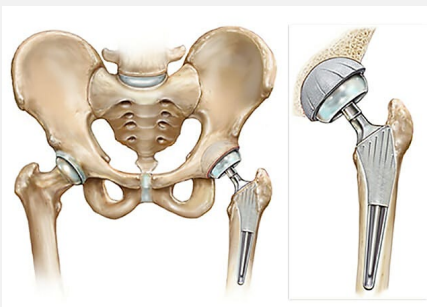
According to current research, roughly 1% of periprosthetic joint infections are caused by fungi. It's a rare occurrence, but it's also a serious consequence for both patients and surgeons. In recent years, more cases of fungal PJI have been observed, presumably due to an increase in the number of joint arthroplasty procedures. Immunosuppression, extended antibiotic usage, rheumatoid arthritis, diabetes mellitus, obesity, psoriasis, and past surgery at the prosthesis site are all risk factors for fungal PJI.² Shoulder PJI is linked to a two-year all-cause death rate that is double that of aseptic patients, according to Austin DC et al. The findings of this study should be used to provide appropriate advice to patients who are at risk of infection after shoulder arthroplasty.³

To summarise, the rarity of fungal PJI limits our knowledge of the disease. The diagnosis and treatment of fungal PJI is still a difficult task for orthopaedic surgeons. There is currently no consensus or guideline for the treatment of patients with fungal PJI. It is necessary to create diagnostic criteria and management guidelines.

Reference:

1. Fu J, Chen X, Ni M, Li X, Hao L, Zhang G, Chen J. The mildly decreased preoperative bilirubin level is a risk factor for periprosthetic joint infection after total hip and knee arthroplasty. *Arthroplasty*. 2021 Dec 1;3(1):40.
2. Chong YC, Tse TST. A case of candida parapsilosis periprosthetic joint infection: Case report and literature review. *Journal of Orthopaedics, Trauma and Rehabilitation*. 2022 June; 29: 1–7
3. Austin DC, Townsley SH, Rogers TH, Barlow JD, Morrey ME, Sperling JW, Sanchez-Sotelo J. Shoulder Periprosthetic Joint Infection and All-Cause Mortality: A Worrisome Association. *JB JS Open Access*. 2022 Feb 23;7(1):e21.00118.

4. A randomised controlled experiment comparing conventional and fast track rehabilitation following complete hip replacement



Total hip replacements (THR) are one of the most popular surgeries, and the number of procedures performed each year in many countries is increasing.¹ The World Health Organization named it the "surgery of the century" because of the significant pain alleviation and successful mobilisation it provides. The success of this operation, however, is determined by the quality of postoperative rehabilitation and the patient's commitment and performance during the procedure.² Over the last 20 years, fast-track (or accelerated recovery after surgery [ERAS]) programmes

for total hip and total knee arthroplasty have evolved. Fast-track techniques can improve clinical and economic outcomes, according to the statistics, but they are not universally used.³ Several patients who are having joint replacements nowadays are young and need to be reintegrated into job life as soon as possible. Furthermore, as the population ages, health-care systems may not be able to fund a lengthy hospital stay or a complex rehabilitation programme. However, in order to achieve the intended widespread adoption of this fast track

rehabilitation programme, a multidisciplinary approach must be standardised and its evidence-based acceptance must be improved. This study was started because there is a lack of high-quality research comparing conventional with fast track hip replacement in the literature.²

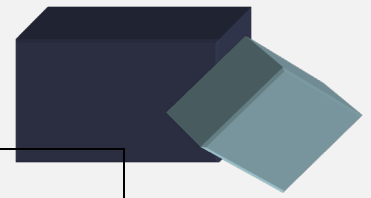
Methods:

In a randomised controlled trial (RCT), sixty patients (32 females, 28 males, mean age 68.4 years) undergoing THR for hip arthritis were compared to either a regular rehabilitation programme (30 patients) or a fast track rehabilitation programme (30 patients) after a normal hospital stay.

Results:

The traditional group's mean length of stay was 7.8 (range: 6–11) days, while the fast track group's was 4.5 (range: 3–5) days ($p < 0.001$). One dislocation occurred in both groups, as did a case of heart failure and a readmission in the traditional group. Patients in the traditional group had a mean Harris Hip Score of 69.3 six weeks after surgery and 82 twelve weeks later, compared to 79 and 91 in the fast track group, respectively. The differences ($p=0.013$ and 0.002 , respectively) were statistically significant.

	Conventional Group	Fast Track Group
Number (cases)	30	30
Age	72 ± 7	65 ± 9
Gender (M:F ratio)	1:2	2:1
BMI (kg/m ²)	28.4± 5	28±5
Preop. WOMAC Score	64,7 19	65,3 ± 19
Preop. Harris Hip Score	41 ± 15	49.6 ± 14.5
Intraop. Blood loss (ml)	237 ±110	197 ± 95
Blood Transfusion	I	0
Start of Mobilization	I-3 days	3-5 h
Length of Stay (days)	7.8±1.7	4.5 ± 0.6
Dislocation	I	I
Congestive heart failure	I	0
Readmission	I	0
6-weeks-WOMAC Score	27.7 ±19	23.4± 15.7
12-weeks-WOMAC Score	17 ±16	9.3±9



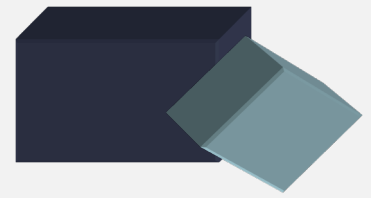
6-weeks Harris Hip Score	69.3 ± 17.5	79 ± 17 (p=0.013)
12-weeks Harris Hip Score	82 ± 14.5	91±9 (p=0.002)
Comparative results between Conventional and Fast track group		

For severe osteoarthritis of the hip joint, total hip replacement is the therapy of choice.¹ Early and rigorous physical therapy, as part of the postoperative care, has been found to minimise edoema, increase range of motion, improve hip muscle strength, and restore function after total joint arthroplasty.² Fast-track surgery is still disputed in patients with particular needs or significant comorbidity. Age over 80, anticoagulant therapy, lung disease, pharmacologically treated psychiatric problem, anaemia, and walking aids were all recognised as being at high risk of preventable medical complications following fast track joint arthroplasty by Jrgensen et al.

Early patient mobilisation and rapid functional recovery following total hip replacement are associated with a better outcome and a lower risk of problems or readmissions. To provide good care throughout the treatment process, this strategy requires meticulous application and dedicated patients and personnel.

Reference:

1. Dawson E, Neufeld ME, Schemitsch E, John-Baptiste A. The impact of wait time on patient outcomes in knee and hip replacement surgery: a scoping review protocol. *Syst Rev*. 2022 Mar 4;11(1):38.
2. Elmoghazy AD, Lindner N, Tingart M, Salem KH. Conventional versus fast track rehabilitation after total hip replacement: A randomized controlled trial. *Journal of Orthopaedics, Trauma and Rehabilitation*. 2022 June
3. Wainwright TW, Memtsoudis SG, Kehlet H. Fast-track hip and knee arthroplasty...how fast? *Br J Anaesth*. 2021 Feb;126(2):348-349.
4. Jørgensen CC, Petersen MA, and Kehlet H. Lundbeck foundation centre for fast-track hip and knee replacement collaborative group. Preoperative prediction of potentially preventable morbidity after fast-track hip and knee arthroplasty: a detailed descriptive cohort study. *BMJ Open* 2016; 6: e009813.



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