

## Original Research Article

# Comparison of short-term outcomes between minimal invasive superpath approach and conventional posterior approach in total hip arthroplasty: a randomized controlled trial

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### ABSTRACT

**Background:** The objective of current study was to compare the short-term outcomes between a cohort of patients that undergone total hip replacement by a superpath technique at the beginning of the surgeon's learning curve, and a cohort of patients that undergone a total hip replacement by a conventional posterior approach.

**Methods:** A cohort of 22 patients was prospectively and randomly selected for being part of a superpath approach group or a conventional posterior approach group. Clinical evaluation was performed in two primary end-points - the third post-operative day and the first month after surgery - using physical exams as the "20 meter walking test" and the "30 seconds sit to stand test", the Harris hip score, the visual analogue scale for pain. Radiological evaluation was also performed.

**Results:** 11 patients underwent the superpath approach and 11 patients underwent the conventional posterior approach. The surgery time was 78.2 min in the superpath group and 59.4 min in the posterior group. The average hospital stay was 3.4 days in the superpath group and 5.3 days in the posterior group. When assessing pain improvement through VAS, it was found that both on the third postoperative day and on the first postoperative month, patients in the superpath group showed greater improvement. There were no differences in functional results with statistical significance. No complications were seen in both groups.

**Conclusions:** Despite the longer surgical time seen with the superpath approach, it managed to significantly decrease the length of hospital stay and obtained better results in improving pain in the short term.

**Keywords:** Hip, Arthroplasty, Superpath, Posterior, Approach

### INTRODUCTION

We are assisting to a growth in the number and proportion of older persons in almost every country in the world. Associated with that, the number of hip joint pathologies are increasing too.<sup>1</sup> Hip arthroplasty has been recognized as one of most successful procedures in modern medicine, improving pain, motor function of the

hip and quality of life among a vast majority of patients submitted to the procedure.

Various approaches are described in the literature for implanting a total hip replacement (THR), but there is no clear evidence of the superiority of one among the others. The choice of approach is usually influenced by the surgeon's experience, patient related factors and

geographic trends. In recent years, a trend of several minimal invasive (MIS) approaches had taken place in the field of hip arthroplasty. The objectives of those approaches are overcoming some disadvantages of conventional approaches as: larger incisions, muscle and capsular damage, increased blood loss and longer postoperative rehabilitation.

In 2011 Dr. James Chow reported a new MIS technique called superpath.<sup>2</sup> This technique was created by combining the percutaneous preparation of the acetabulum through a portal of the PATH approach and the femoral reaming and broaching of the super cap approach.<sup>3,4</sup> This technique has already a good support in the literature, where studies have shown good short-term results, low rate of complications, and good radiologic replication.<sup>5-7</sup> Despite of the evidence gathered about the good results of this new approach, the effect of the learning curve on patient safety and surgical outcome remains unclear.

The objective of current study was to compare the short-term outcomes between a cohort of patients that undergone total hip replacement by a superpath technique, and a cohort of patients that undergone a total hip replacement by a conventional posterior approach. Our hypothesis is that in view of the more preservative profile of the superpath approach in relation to the musculature and the joint capsule, the short-term results will prove to be superior compared to a conventional posterior approach, despite the associated learning curve.

## **METHODS**

Our orthopedic department in centro hospitalar Trisos Montes e Alto Dour, had contact with the superpath approach at the end of 2019. A prospective, observational study was initiated from January 2020 to July 2020 in order to assess the short-term results of this approach compared to the conventional posterior approach most commonly used.

### ***Inclusion criteria***

Patients with age between 50 and 80 years old, with diagnosis of primary hip arthrosis, and with indication to cementless hip replacement surgery were included in the study.

### ***Exclusion criteria***

Patients with other articular surgeries predicted for the same year, other arthroplasty done anteriorly, BMI above 35 kg/m<sup>2</sup>, unable to walk 20 meters without help, neurologic disease (Parkinson, stroke) that impaired ambulation; dementia disease, or unable to read and understand instructions given were excluded from the study.

All patients included in the study received oral and written information and signed an informed consent. They were placed in the superpath group or in the conventional posterior group depending if they were consulted by surgeon A or surgeon B; both experienced hip surgeons with more than 100 THR/year as long as they met the criteria.

Surgeon A performed all superpath approaches on all patients that he observed that meet the criteria. Surgeon B maintained the conventional posterior approach in all patients who also respected the mentioned criteria. The two primary end-points for assessing the outcome of the two interventions were the third postoperative day and the first month after surgery.

Demographic variables like age, gender, BMI, ASA degree were recorded. Before surgery, patients underwent a series of physical tests and functional questionnaires in order to assess baseline performance before hip arthroplasty. The same tests were performed again on the third postoperative day and finally on the first month after surgery, the measurements parameters are revealed in (Table 1).

The Harris hip score was used to assess patients' hip function. The WOMBAC questionnaire and the visual analogue pain scale (VAS) for pain assessment. Patients were subjected to physical exams such as the "20 meter walking test" where the number of seconds it took for patients to walk 20 meters alone was recorded. And the "30 seconds sit to stand test", where the number of repetitions that patients were able to do in 30 seconds was recorded

The surgical parameters recorded were: preoperative and postoperative hemoglobin, the need for transfusion, the time of surgery and the time of hospitalization. Several radiological parameters were evaluated: acetabular inclination, femoral stem alignment and integration of the implant.

Finally, all complications like; periprosthetic fracture, dislocation, peri-implant infection, need for hip revision, neurologic compromise, deep vein thrombosis, pulmonary embolism and death were registered until the end of the first postoperative month.

### ***Statistical analysis***

Statistical analysis was carried out using the SPSS version 23. Significance was set to  $p < 0.05$ . The Kolmogorov-Smirnov test was used to determine the normal distribution. For comparisons, univariate analysis was used for categorical variables by the Chi-square test in variables with normal distribution and the Mantel-Haenszel test for non-parametric data. The Student's t-test or the Mann-Whitney U tests were used in continuous variables.

**Table 1: List of parameters evaluated in the study.**

Functional parameters	Measuring method	Frequency		
Outcome		Pre-operative	2 days post operation	1 month post operation
Functional	Harris hip score	x		x
Pain	WOMBAC -pain	x		x
Pain	VAS	x	x	x
20 meter walk test	Chronometer	x	x	x
30 seconds sit to stand test	Repetitions	x	x	x
Surgical parameters	Units			
Hemoglobin pre-operative	g/dl			
Hemoglobin post-operative	g/dl			
Transfusional needs	N°			
Time of surgery	Minutes			
Hospitalization time	Days			
Radiologic evaluation	Units			
Acetabular inclination	Degree			
Femoral alignment	Degree			
Implant integration	Degree			
Complications				
Periprosthetic fracture	Yes/No			
Neurological compromise	Yes/No			
Infection	Yes/No			
Deep vein thrombosis	Yes/No			
Pulmonar emboly	Yes/No			
Dislocation	Yes/No			
Revision	Yes/No			

## RESULTS

Starting from 1 January to 31 July 2020, a total of 58 patients were treated with a cementless total hip arthroplasty because of osteoarthritis of the hip. Out of these, only 26 respected the inclusion and exclusion criteria and were considered eligible for the study and only 22 had a complete follow-up. Out of the 22 patients, 11 underwent a superpath approach and 11 underwent a conventional posterior approach.

### Demographic characteristics

When assessing the demographic characteristics of the patients, it was found that age was statistically different in the two groups: superpath group; mean age 59.6 (SD=8.7); posterior group; mean age 64.2 (SD=10.61) (p=0.035). The remaining demographic characterization did not show significant statistical differences and are shown in (Table 2).

### Surgical parameters and hospital stay

In the evaluation of surgical parameters, it was found that the average surgical time in the superpath approach was 78.2 min (SD=13.1); in the posterior approach it was 59.4

min (SD=15.0), with a statistically significant difference (p=0.005). The length of hospital stay was on average 5.3 days (SD=0.46) in patients undergoing a posterior approach and 3.4 days (SD=0.92) in patients undergoing a superpath approach. This difference was statistically significant with p=0.001. The difference between preoperative and postoperative hemoglobin averaged 3.7 g/dl (SD=0.78) in superpath approach and 3.7 g/dl (SD=0.97) in posterior approach, p=0.905, none of the patients required blood transfusion.

### Radiological parameters

In the radiological parameters, there were no statistically significant differences in the acetabular inclination, in the alignment of the femoral stem and in the dysmetria of the lower limbs as shown in (Table 3).

### Pain assessment

In the pain assessment using the visual analogue scale, it was found that on the third postoperative day the average pain improvement was 1.82 in the posterior approach (SD=0.70) and 3.27 in the superpath approach (SD=0.60); p=0.244. In the first postoperative month there was an average improvement of 4.27 (SD=0.47) in the posterior approach and an average improvement of 7 in the superpath approach (SD=4), p=0.367 (Figure 1).

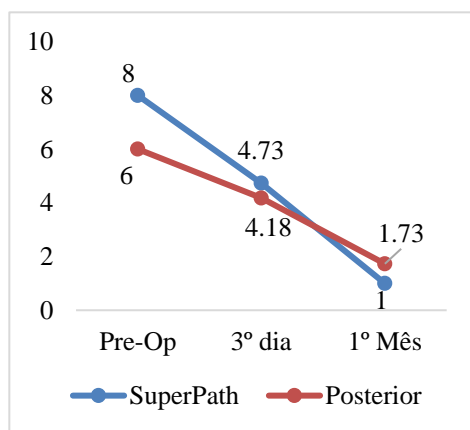
**Table 2: Demographic characteristics of the sample.**

Parameters	Superpath	Posterior	P value
Gender (M/F)	6/5	6/5	1
BMI	27.6 (dp=12.3)	26.8 (dp=3.11)	0.575
ASA II/III	11/0	7/4	0.463
Pre operative Hb	13.8	13.4	0.759
Harris hip score pre-operative	46.2 (dp=18.9)	43 (dp=13.42)	0.653
Wombac pain pre-operative	12.73 (dp=5.16)	14.18 (dp=2.75)	0.419
VAS pre operative	8 (IQ=1)	6 (IQ=5)	0.334
30 seconds sit to stand test; pre operative	10.82 (dp=4.05)	9.82 (dp=2.68)	0.502
20 meter walk test- pre operative (seconds)	33 (IQ=27)	32 (IQ=27)	0.599

**Table 3: Radiographic evaluation.**

	Superpath	Posterior	P value
Acetabular inclination	44.2° (dp=8.85)	46,0° (dp=7.90)	0.626
Femoral stem alignment	0.39° (dp=0.87)	0.21° (dp=0.76)	0.608
Lower limb dysmetria	0.42 cm (dp=0.64)	0.39 cm (dp=0.35)	0.909

The average improvement in the first postoperative month in the Wombac pain score was 11.27 (SD=2.80) in the superpath approach and 10.55 (SD=5.26) in the posterior approach; p=0.690.



**Figure 1: Evolution of pain accessed with VAS.**

**Functional results**

In the functional evaluation through Harris Hip Score in the first postoperative month, it was found that the average improvement was 28.81 (SD=13.82) in patients undergoing a posterior approach and 26.27 (SD=22.67) in patients undergoing superpath approach (p=0.753).

In the 20 meter walk test on the third postoperative day, there was an aggravation in the median time of 54 seconds (IQ=110) in the group submitted to the posterior approach and an aggravation of 49 seconds (IQ=27) in patients undergoing the superpath approach, p=0.450. In the 20 meter test at the first month, it was found that in patients undergoing the posterior approach there was a median worsening of 2 seconds (IQ=30) and in patients

undergoing the superpath approach there was a median improvement of one second (IQ=21), p=0.818. In 30 seconds sit to stand test when comparing the difference in results between the third postoperative day and those obtained in the preoperative period, it was found that in the patients submitted to the posterior approach there was a decrease of 2.9 repetitions (SD=2.63), and in the superpath approach, a decrease of 2 repetitions (SD=2.57), p=0.470. The same test performed in the first month after surgery showed an average improvement in the number of repetitions compared to the preoperative of 0.46 (SD=2.62) in patients submitted to the Posterior approach and 1.0 (SD=3.58) in patients undergoing the superpath approach, p=0.688.

**Complications**

None of the previously defined complications were recorded or observed during the first month. Thus, there was no intra-operative or postoperative periprosthetic fracture in either group. There was no case of peri-implant infection, no case of dislocation of the prosthesis and no systemic or local complications like neurological impairment, pulmonary embolism or deep vein thrombosis.

**DISCUSSION**

Unlike most studies that we currently find in the literature, regarding the superpath approach, which observe the results at least 3 months after surgery; our work aimed to verify the advantages and disadvantages of this new approach from the first days after surgery until the end of the first month after surgery. In fact, a minimally invasive approach, less damaging to muscles and that preserves the capsule and periarticular structures should, in theory, present better functional results earlier.

This, at the same time, cannot compromise radiological or long-term results.

This work was carried out in the middle of the COVID-19 pandemic. This fact was the main limitation for our sample size, given the logistical barriers placed on all surgical activities carried out in our hospital. On the other hand, it seemed important to expose our results, exactly because they reveal the influence of the COVID-19 and in itself is a new relevant data that eventually does not appear in most of the works carried out on this new approach.

### ***Demographic characteristics***

Despite the prospective molds under which this work was done, there was a statistically significant difference between the average age of the group of patients submitted to superpath and the group submitted to a posterior approach. In fact, the average age of the superpath group was 59.6 years and that of the posterior group was 64.2 years. This bias is largely due to the small sample size of both groups. However, when analyzing the other demographic characteristics, we found that both groups do not present any other significant discrepancy at baseline. In other words, both groups have similar BMI results, there are no significant differences in ASA degree, in their preoperative hemoglobin, in functional results observed by the HHS or in pre-operative pain classified by both VAS and the Wombac questionnaire. Finally, when physical tests were performed, 30 seconds sit to stand test, 20 meter walk test, it was found that both groups showed similar values. Thus, despite the age difference, both groups were functionally similar, so there do not appear to be significant demographic differences that detract from the results of this work.

### ***Hospital stay***

In our study, we found that the superpath approach revealed shorter hospital stays, with an average of 3.36 days while in the conventional posterior approach, patients had an average of 5.27 days. The policy of our service is to discharge patients, after they present good control of pain complaints with simple oral analgesia, walk autonomously with the support of two crutches and do not present any local or systemic impediment complication. In the literature we find evidence that goes according to our study, with a meta-analysis by Xu showed that the hospitalization period was 0-1 days shorter in hip replacements via mini-incision compared to hip replacements via conventional approaches.<sup>10,11</sup> In fact, preserving external rotators and reducing stretching of the gluteus medius causes this approach to be associated with less postoperative pain and less need for intravenous analgesia or narcotics. This decrease in hospital stay, proved to be extremely important during this pandemic period, as more than ever it was necessary to establish effective strategies to reduce hospital stay, without compromising the health and well-being of patients.

### ***Time of surgery***

We found that when compared to the conventional approach, the surgical time increased significantly in the superpath approach. The average surgical time of the superpath was about 20 minutes longer than the conventional approach (78.2 minutes vs. 59.5 minutes). This longer surgical time is expected, as these 11 patients were operated on at the beginning of the surgeon's learning curve. Other studies have also pointed to a longer operative time compared to the conventional posterior approach, with values between 69.6 minutes and 143.7 minutes, and a systematic review with data on 630 patients, that showed that superpath was on average 18.4 minutes longer than conventional posterior approach.<sup>12,13-17</sup> So, the average time recorded in our study is within this range.

### ***Blood loss***

There was no significant difference in blood loss recorded through the difference in hemoglobin between preoperative and postoperative values. There was no need for transfusion in any patient in any group. The literature also meets these results.<sup>18</sup> It would be predictable that with a less invasive approach there would be less blood loss, however at least during the beginning of the learning curve the surgical time factor also seems to weigh, so in the end both have similar values.

### ***Radiological parameters***

One of the necessary premises that characterize a successful minimally invasive approach is that it does not compromise the ideal positioning of the prosthetic components. The smaller exposure in the superpath approach could, theoretically be associated with improper implant position. However, in our study, when analyzing some radiological parameters, we found that in fact the results obtained were consistent in the 11 patients submitted to the superpath approach, similar to those obtained by the posterior approach and within the values considered ideal in the literature.<sup>14</sup>

### ***Pain assessment***

In the current work, we evaluated the pain perceived by the patient in two ways: VAS and Wombac score for pain. When evaluated by VAS, it was found that on the third post-operative day, there was an improvement of 1.87 values on average in the group submitted to the posterior approach in relation to the preoperative value, while the patients submitted to the superpath approach reported an improvement of 3.27 in relation to the preoperative value. This more significant improvement in pain in patients undergoing the superpath approach reinforces the explanation offered for a shorter hospital stay obtained in these patients.



When evaluated at the first postoperative month, the difference in improvement between the two groups dissipates. In fact, after the first month, patients undergoing the superpath approach report an improvement in pain compared to that on the third postoperative day of 3.73 values and patients undergoing the posterior approach reported an improvement of 3.18 values. These results meet the short-term advantages of the superpath approach that dissipate over time to conventional approaches.

When assessing the difference in pain one month after surgery compared to that described in the preoperative period using the Wombac scale, it was found once again that there was no statistically significant difference between both groups, with the posterior approach group being associated with the superpath group being associated with a slightly higher improvement (11.27 in superpath vs. 10.55 points in the posterior group).

### **Functional results**

As with pain assessment at the end of a month, functional assessment using the Harris hip score at the end of one month did not show statistically significant differences. Both results were excellent with an improvement in the posterior approach group from 43 to 71.82 and in the superpath group from 46.18 to 72.45. This score was only evaluated before surgery and after one month of surgery, and did not reveal differences, however, in the literature, more favorable results are described for the superpath approach after 7 postoperative days where a meta-analysis found that in 246 patients (121 from superpath and 125 from conventional approach) the superpath group obtained results 10.2 points higher in the Harris hip score than the conventional group after 7 days.<sup>14</sup>

In current work, we performed two physical tests; the “30 seconds sit to stand test” and the “20-meter walk test” for functional evaluation. Both tests validated in the literature regarding their reliability for functional assessment in patients undergoing hip arthroplasty.<sup>15,16</sup> What we verified both in the “20 meters walk test” and in the “30 seconds sit to stand test” was that on the third postoperative day, both in patients submitted to the superpath approach and in patients submitted to the conventional posterior approach, there was a worsening in the results. Patients undergoing the superpath approach took an additional 49 seconds to complete the “20 meters walk test” while patients undergoing the Posterior approach took an additional 54 seconds to complete the same test. In the “30 second sit to stand test”, it was found that patients undergoing the superpath approach performed 2 fewer repetitions while patients undergoing the posterior approach performed 2.9 fewer repetitions. These data have no statistical significance but point to functional results, on the third postoperative day, which tend to be better in the superpath approach than in the posterior approach.

The functional results evaluated in the first postoperative month of the two tests already described, demonstrated a slight improvement in relation to the values obtained before surgery. Once again, it is noted that at the end of the first month the trend of superiority in the functional tests of superpath fades, with convergence between the two approaches. In fact, at the end of the first month, the results of both tests were quite similar to those obtained in the preoperative period, demonstrating the functional recovery in relation to the one verified on the third postoperative day in which the results worsen in relation to the preoperative period.

### **Complications**

In current study, there were no local or systemic complications in both groups. However, it should be noted that the follow-up of just one month is a major bias in the analysis of complications. The literature points to the dislocation rate as one of the biggest disadvantages of the conventional posterior approach. Superpath not only brought a less invasive and more preservative approach, but also tried to overcome this disadvantage, at least theoretical, since the external rotator muscles remain intact and the joint capsule is repaired. In the literature a randomized analysis report a reduction in the dislocation rates from 6.2 to 1.9% with minimally invasive approach in patients with neurological disorders. One of the main complications associated with the superpath approach, which was not verified in our sample, is the periprosthetic fracture. Chow and Fitch reported three intra-operative periprosthetic fractures, two femoral and one acetabular.<sup>2</sup> Carlomagno reported one intra-operative femoral fracture.<sup>12</sup>

### **Limitations**

The current study has a large limitation on the sample size. In this respect, it is worth highlighting again the pandemic period under which it was carried out and which proved to be an obstacle to the sample size, but on the other hand an opportunity to explore the influence it had on these patients. It is also worth mentioning the short follow-up period in this work; just one month, but it was optional because what was intended was to explore the influence that the new approach has in the initial post-surgical phase and not in the long term.

### **CONCLUSION**

In current study, it was found that the initial phase of the learning curve of the superpath approach not only does not harm patients compared to the conventional posterior approach, but it has demonstrated clear advantages such as a statistically significant decrease in hospital stay, functional results observed through physical tests in the immediate postoperative period tend to be slightly better and a tendency towards an earlier recovery from postoperative pain. The functional results through the Harris hip score and the radiological results at the end of

the first month proved to be identical, also demonstrating the reliability of this new technique.

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## REFERENCES

- Zhang YJ. Epidemiology of osteoarthritis. *Clin Geriatr Med*. 2010;26(3):355-69.
- Chow J, Penenberg B, Murphy S. Modified micro-superior percutaneously assisted total hip: early experiences and case reports. *Curr Rev Musculoskelet Med*. 2011;4:146-50.
- Penenberg BL, Bolling WS, Riley M. Percutaneously assisted total hip arthroplasty (PATH): a preliminary report. *J Bone Joint Surg Am*. 2008;90:209-20
- Murphy SB, Tannast M. Conventional vs. minimally invasive total hip arthroplasty. A prospective study of rehabilitation and complications. *Orthopade*. 2006;35:766-8.
- Gofton W, Chow J, Olsen KD, Fitch DA. Thirty-day readmission rate and discharge status following total hip arthroplasty using the supercapsular percutaneously-assisted total hip surgical technique. *Int Orthop*. 2015;39:847-51.
- Della Torre PK, Fitch DA, Chow JC. Supercapsular percutaneously-assisted total hip arthroplasty: radiographic outcomes and surgical technique. *Ann Transl Med*. 2015;3:180.
- Xie J, Zhang H, Wang L, Yao X, Pan Z, Jiang Q. Comparison of supercapsular percutaneously assisted approach total hip versus conventional posterior approach for total hip arthroplasty: a prospective, randomized controlled trial. *J Orthop Surg Res*. 2017;12:138.
- Timothy S, Bruce W, Jacqueline KP, René F, Randy B. Hand-held dynamometry correlation with the gold standard isokinetic dynamometry: a systematic review. 2011;3(5):472-9.
- Ishøi L, Hölmich P, Thorborg K. Measures of hip muscle strength and rate of force development using a fixated handheld dynamometer: intra-tester intra-day reliability of a clinical set-up. *Int J Sports Phys Ther*. 2019;14(5):715-23.
- Andrew WB, Robert S, David A. Use of the supercapsular percutaneously assisted total hip approach for femoral neck fractures: surgical technique and case series. *J Orthop Surg Res*. 2016;11(1):113.
- Xu G, Hu L, Yang S. Short-term follow-up study of superpath minimally invasive approach in artificial femoral head replacement for senile femoral neck fractures. *Hainan Med J*. 2018;29(17):2400-4.
- Cardenas-Nylander C, Bellotti V, Astarita E, Moya Gomez E, Ribas Fernandez M. Innovative approach in total hip arthroplasty: supercapsular percutaneously assisted. *Hip Int*. 2016;26:34-7.
- Chow J, Fitch DA. In-hospital costs for total hip replacement performed using the supercapsular percutaneously assisted total hip replacement surgical technique. *Int Orthop*. 2017;41:1119-23.
- Más-Martínez J, Sanz-Reig J, Morales-Santías M, Bustamante D, Verdu RC, Martínez GE. Estudio de cohortes comparativo del abordaje superpath con abordaje convencional del abordaje posterior encirugía protésica primaria de cadera no cementada: curva de aprendizaje resultados a corto plazo. *Rev Esp Cir Ortop Traumatol*. 2019;63:346-54.
- Dobson F, Bennell KL. Recommended performance based tests to assess physical function in people diagnosed with hip or knee osteoarthritis. *Osteoarthritis Cart*. 2012;21(8):1042-52.
- Bayram U, Refik HB, Ertugrul Y, Senol C, Serpil K, Vasfi K. Reliability of 4-meter and 10-meter walk tests after lower extremity surgery. *Disab Rehab*. 2017;39:2572-6.
- Ramadanov A. Comparison of short-term outcomes between superpath approach and conventional approaches in hip replacement: a systematic review and meta-analysis of randomized controlled trials. *J Orthopaed Surg Res*. 2020;15:420.
- Zhenguo S, Heng L, Yang H, Jikang M. Systematic review on the curative effect of total hip arthroplasty through supercapsular percutaneously-assisted total hip approach versus posterolateral approach for treatment of hip diseases. *J Trad Chin Orthop*. 2018;30(01):32-7.

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