

Clinical Summaries



SuperPath[®]

*The Direct Superior Portal Assisted
Total Hip Approach*

*"What we see often is only a
fractional part of what it really is"*



MicroPort
Orthopedics

Full Function, Faster[®]

Clinical Summaries

Introduction

SuperPath® is a portal assisted Total Hip Approach (THA) that accesses the capsule superiorly through the interval between the gluteus minimus and piriformis with the potential not to cut any muscles or tendons. The femur is prepared with the head and neck intact reducing the chance of fracture. The acetabulum is prepared under direct visualization and a cannula facilitates the use of inline instrumentation. If necessary, there is an extensible option allowing surgeons to continue the technique from a familiar view without repositioning the patient.

The goals of a tissue sparing approach can be observed from a patient and from a surgeon's point of view. For patients, pain relief, early post-operative function and improved satisfaction are the main goals, while for surgeons a safe and reproducible procedure, well positioned components and minimizing complication rate are most important.²³

This overview summarizes the recent clinical papers on SuperPath®, categorized in 3 groups:

Full Function, Faster®

Evaluating patients functional outcome post-operative; discharge status; Length of Stay (LOS) and complication rates.

Learning Curve

Showing that SuperPath® is a technique that can be implemented safely.

Economic Benefits

Describing the reduction of total cost of care by adoption of the technique.

Table of Clinical References

Full Function, Faster®

Thirty-day readmission rate and discharge status following total hip arthroplasty using the supercapsular percutaneously-assisted total hip surgical technique.
Gofton W et al. International Orthopaedics. May 2015, Volume 39, Issue 5, pp 847–851

Outcomes for over 1000 consecutive total hip replacements using the Supercapsular percutaneously-assisted total hip replacement surgical technique.
Chow J et al. 29th ISTA, Boston 5 - 8 October, 2016

Driving after microinvasive total hip arthroplasty.
Qurashi, S, Chinnappa J, Lord, SJ, Nazha, A, Gordon, J, Chow J; J Arthroplasty. 2017 May;32(5):1525-1529

Supercapsular Percutaneously Assisted Total hip (SuperPath®) Arthroplasty:
Results and Complications on 444 Consecutive Cases.
Grandic E et al. 29th ISTA, Boston 5 - 8 October, 2016

SuperPATH® Minimally Invasive Total Hip Arthroplasty – An Australian Experience.
Qurashi S, Chinnappa J, Rositano P, Asha S; JISRF, Reconstructive Review. Vol. 6, No. 2, July 2016

Learning Curve

Percutaneously assisted total hip (PATH) and Supercapsular percutaneously assisted total hip (SuperPath®) arthroplasty: learning curves and early outcomes.
Rasuli KJ, Gofton W; Ann Transl Med. 2015 Aug;3(13):179

Supercapsular percutaneously-assisted total hip arthroplasty: radiographic outcomes and surgical technique.
Della Tore PK, Fitch D, Chow J; Ann Transl Med. 2015 Aug;3(13):180

The Learning Curve of a Tissue-Sparing Total Hip Replacement Surgical Technique: a Multi-Centre Assessment.
Gofton W, Le D, Sciortino R, Cronin M, Parker A, Fitch D; EFORT Vienna; poster, Wednesday 31 May, 2017

Economic Benefits

In-hospital costs for total hip replacement performed using the supercapsular percutaneously assisted total hip replacement surgical technique.
Chow J, Fitch D; International Orthop 2016, Nov 12

In-hospital cost comparison between the standard lateral and supercapsular percutaneously-assisted total hip surgical techniques for total hip replacement.
Gofton W, Fitch DA International Orthopaedics March 2016, Volume 40, Issue 3, pp 481–485

Full Function, Faster[®]

A variety of soft-tissue sparing and minimally invasive techniques to operate patients with a THA, have been gaining interest from patients and surgeons. Today, patients live longer, are leading a more active lifestyle and want to recover to their normal way of life; and this in a fast way.

Thirty-day readmission rate and discharge status following total hip arthroplasty using the supercapsular percutaneously-assisted total hip surgical technique.

Gofton W et al. International Orthopaedics. May 2015, Volume 39, Issue 5, pp 847–851

Objective:

40 % of costs associated in a period of 30 days of care for total joint replacements, are due to post-discharge activities and 81 % of those are specifically due to readmissions and discharging patients to post-acute care facilities. This study wants to determine these two variables for patients with a total hip arthroplasty by using a tissue-sparing surgical technique and to compare to those previously reported in the United States. The 30-day readmission rate was defined as the percentage of patients who had a subsequent hospital admission in the same or a different hospital within 30 days of their THA procedure for any reason.

Cohort:

479 patients

Method:

The healthcare databases at three institutions were searched for all primary THAs performed by three surgeons using the SuperPath[®] surgical technique between January 2013 and July 2014. All primary THAs regardless of indication or patient demographic, were included. Collected data elements included: complications, 30-day all-cause readmission rate, discharge status, transfusion rate, and LOS.

Results:

The 30-day readmission rate was 2.3% (range, 1.5-3.2%), nearly half than previously reported in the United States (4.2%)¹

The mean LOS (1.6 days) was less than half the national average in the United States (3.3 days)² and national median in Canada (5.0 days)³

The overall transfusion rate was low (3.3%), but rates were somewhat variable between sites (0.7-8.0%). This was expected, as each site had its own anticoagulation and transfusion protocols. This rate is significantly lower than those previously reported in the United States (22.2-25.5%).⁴⁻⁵

Outcomes for over 1000 consecutive total hip replacements using the Supercapsular percutaneously-assisted total hip replacement surgical technique.

Chow J et al. 29th ISTA, Boston 5 - 8 October, 2016

Objective:

Measuring Surgical outcomes including operative time, blood loss, incision length, length of stay (LOS), and complications.

Cohort:

First 1074 primary THA performed by one surgeon with SuperPath® technique.

Method:

Between September 2008 and April 2015, one surgeon performed 1,074 consecutive primary THRs using the SuperPath® surgical technique. Surgical outcomes such as operative time, blood loss, incision length, length of stay (LOS), and complications were collected.

Results:

The mean operative time, blood loss, incision length, and LOS were 75 minutes (range, 40-141), 150 mL (range, 50-900), 7.4 cm (range, 5-12), and 1.4 days, respectively.

In total there were 29 complications including: 6 (0.5%) periprosthetic fractures; 4 (0.3%) thromboembolisms; 3 (0.2%) subsidence; 2 (0.1%) heterotopic ossifications; and 1 (0.09%) dislocation.

There were no instances of infection or neurovascular injury. Mean HHS improved from 45.4 preoperatively to 89.9 and 87.2 at 6 and 12 months, respectively. Mean UCLA scores improved from 3.9 preoperatively to 5.5 and 5.6 at 6 and 12 months, respectively.

Full Function, Faster[®]

Driving after microinvasive total hip arthroplasty.

Qurashi, S, Chinnappa J, Lord, SJ, Nazha, A, Gordon, J, Chow J; J Arthroplasty. 2017 May;32(5):1525-1529

Objective:

Guidelines on normal Brake Reaction Time (BRT) have a wide range across the world, varying from 0.7s to 1.5s. The purpose of this study was to assess the ability to drive in relation to BRT in the early post-operative period following SuperPath[®] THA.

Driving is one of the most important aspects of daily life and literature lacks clear clinical and legal guidelines on the appropriate return to driving time after Total Hip Arthroplasty (THA). Current, traditional recommendations include advising patients against driving for up to 6 weeks post all THAs or right-sided THA. To the authors' knowledge only one study has been published so far investigating Brake Reaction Times (BRTs) using a muscle sparing approach. However, this study does not describe which type of muscle sparing approach was actually performed on the cohort of investigated patients. Also, it shows that BRTs normalized by 2 weeks post right-sided THA for 87% of the 38 analysed subjects

Cohort:

100 patients, 50 men – 50 woman, mean age 63 years (range 25-86).

Method:

The healthcare databases at three institutions were searched for all primary THAs performed by three surgeons using the SuperPath[®] surgical technique between January 2013 and July 2014. All primary THAs regardless of indication or patient demographics, were included.

Collected data elements included: complications, 30-day all-cause readmission rate, discharge status, transfusion rate, and Length of Stay (LOS).

Method and Results:

Pre-operative BRT was measured the day of the surgery. BRTs were measured at day 1 and day 2 post-surgery and a subset of 25 consecutive patients underwent repeat BRT testing at 2 weeks follow-up appointment.

The mean BRT at baseline pre-operatively was 0.63s and 93% of the patients achieved or improved on their mean BRT at their post-operative assessment at day 1 or 2 following surgery.

Post-op mean BRT was 0.53s with a p value of < 0.0001. In the right hip subset of patients, the mean pre-operative BRT was 0.63s and the mean BRT post-operatively was 0.54s with a p value of < 0.0001.

All the patients investigated at 2 weeks post-surgery achieved mean better BRT than their pre-operative results. This is an important aspect of the study, since BRT could be affected by opioid analgesia.

In summary, there are several factors involved in safely resuming driving and recommendations on early return to driving should be individualized to each patient by the treating surgeon. However, in patients undergoing SuperPath[®] THA, this study demonstrate that BRT reaches pre-operative values by day 2 post-surgery and that those patients might be suitable to drive earlier than the traditionally recommended 6 weeks post-surgery.

Supercapsular Percutaneously Assisted Total hip (SuperPath®) Arthroplasty: Results and Complications on 444 Consecutive Cases.

Grandic E et al. 29th ISTA, Boston 5 - 8 October, 2016

Objective:

Early outcomes and complications of 444 consecutive SuperPath® cases performed by a single surgeon over a 2 year period were evaluated.

Results:

Mean operative time: 50min, Mean LOS: 1.5 days. Complications rates were low (0.2%), including 2 dislocations, 2 calcar fractures, 5 stem subsidence, 2 superficial infections and no documented DVT/PEs.

The SuperPath® technique was associated with shorter operative time, with dislocation rates and complications below the US national average compared with other techniques

Full Function, Faster[®]

SuperPATH[®] Minimally Invasive Total Hip Arthroplasty – An Australian Experience.

Qurashi S, Chinnappa J, Rositano P, Asha S; JISRF, Reconstructive Review. Vol. 6, No. 2, July 2016

Objective:

Measuring surgical and functional outcomes in a single surgeon series of SuperPath[®] in Australia.

Method:

Retrospective analysis of first 100 SuperPath[®] cases; Surgical outcomes were reviewed with a minimum follow-up of 1 year.

Results:

By 2 weeks post-op, 86% of patients were ambulant without walking aids; 84% of patients were able to dress independently.

81% of patients were driving within 4 weeks of surgery.

Of patients who were working full-time prior to surgery, 33% of them were back to work or functional baseline within 1 week post-op, and 52% by 2 weeks.

All 100 patients reported to be extremely satisfied. Only 4 complications were reported. 91 % of the operated patients did not need opioid analgesia.

Table 1: Comparison Fast Recovery with other approaches

	<i>SuperPath®</i>	<i>Direct Anterior</i>	<i>Posterior</i>	<i>Anterior Supine Intermuscular</i>
Mean length of stay in US	1.6 days ⁶⁻⁸	2.9 days ^{9,7,19-21}	3.49 days ^{9,17,19-21}	2.39 days ^{14,15}
Patient Restrictions in US	None		Abduction Pillow	Patients instructed to use walker for 2 weeks ¹⁴
<i>Discharge Status</i>				
Home	91.4% ⁷	81.2% ^{9,20,21}	70.9% ^{9,20,21}	NR
SNF	4.1% ⁷	6.9% ^{9,17}	10.4% ^{9,17}	NR
HHC	4.4% ⁷	9.1% ^{9,17}	6.4% ⁹	NR

Table 2 : Comparison Complications with other approaches

	<i>SuperPath®</i>	<i>Direct Anterior</i>	<i>Posterior</i>	<i>Anterior Supine Intermuscular</i>
Mean Blood Loss	328 mL ⁶	381.9 mL ^{9,19,21}	311.1 mL ^{9,19,21}	490.7 mL ^{15,16}
Complication Rate	2.7 - 4.7% ^{7,8}	13.1% ^{9,11,17-23}	11.2% ^{9,11,17,19-23}	8.2% ^{14,15}

Greater inadvertent muscle damage in direct anterior approach when compared with the direct superior approach for total hip arthroplasty. Amanatullah D.F. et al, Bone Joint J 2016; 98-B: 1036-42.

The DA approach caused substantially greater damage to the gluteus minimus muscle and tendon when compared with the DS approach. The tensor fascia lata and rectus femoris muscles were damaged only in the DA approach. There was no difference in the amount of damage to the gluteus medius muscle and tendon, piriformis tendon, obturator internus tendon, obturator externus tendon or quadratus femoris muscle between approaches.

The posterior soft-tissue releases (necessary to mobilize the femur) of the DA approach damaged the gluteus minimus muscle and tendon, piriformis tendon and obturator internus tendon. Additionally, these structures are not routinely repaired after DA approach.

The authors conclude that the DS approach caused less soft tissue damage than DA approach. This publication clearly shows that the Direct Anterior approach is not as tissue sparing as it is often promoted and that significant tissue damage is performed during the releases necessary to mobilize the femur.

Learning Curve

Approaches should ideally provide a continuum for the surgeon. This could keep a surgeon within his comfort zone during the learning curve of the procedure, while leaving options for complicated cases. It is generally accepted that a surgeon adopting a new technique will experience an increase in operative time, which then decreases as the surgeon gains experience, however this should not be at expense of increasing patients' complications.^{26,27}

Percutaneously assisted total hip (PATH) and Supercapsular percutaneously assisted total hip (SuperPath®) arthroplasty: learning curves and early outcomes.

Rasuli KJ, Gofton W; Ann Transl Med. 2015 Aug;3(13):179

Objective:

Evaluate the early outcomes of two of the micro-posterior approaches (PATH® and SuperPath®) when performed by a non-developer surgeon. A secondary objective was to evaluate the learning curve associated with both approaches.

Cohort:

Two patient cohorts, representing a total of 99 primary total hips at a single training institution.

Method:

A single-centre retrospective review from the first 50 consecutive PATH® cases performed between 2009 and 2011 (one patient who presented with a hip fracture was excluded) and the first 50 consecutive SuperPath® cases performed between 2013 and 2014.

Results:

Early results demonstrate that the PATH and SuperPath® approaches can be adopted with minimal complications and outcomes consistent with innovator outcomes, even during the learning curve.

Mean LOS was 3 days in the PATH cohort with the large majority of patients being discharged directly home (81.6%). Mean LOS in the SuperPath® cohort was even shorter (2.2 days). In the SuperPATH cohort, 20% of patients were discharged by Post-op day (POD) 1, 64% by POD 2, and 96% by POD 3.

Learning curves for the PATH® and SuperPath® approaches were found to be significantly different (P value <0.001). By the 40th case, operative time for the PATH® cohort had reached a plateau. In contrast, operative time in the SuperPath® group was still significantly decreasing by the 50th case (P value <0.001), SuperPath® operative time continued to decrease by case 50.

Complication rates were only 4.0% in both cohorts.

Supercapsular percutaneously-assisted total hip arthroplasty: radiographic outcomes and surgical technique.

Della Tore PK, Fitch D, Chow J;Ann Transl Med. 2015 Aug;3(13):180

Objective:

The study describes an independent radiographic assessment of an early consecutive series of patients who underwent SuperPath® arthroplasty.

Cohort & Method:

Total of 66 consecutive patients' postoperative radiographs were analysed by an independent American Board of certified orthopaedic surgeons. This series of patients were collated from the first 100 cases performed by a single surgeon.

Results:

Independent assessment of implants position showed all components to be well seated. Offset and leg lengths had been restored to within 5 mm of the contralateral hip in all cases. The mean acetabular component abduction angle was 40.13° (SD 6.30°). Implant position was optimal within the 'learning curve' of the first 100 cases for described THA safe zones.

Table 3 : Comparison implant positioning & operative time with other approaches

	<i>SuperPath®</i>	<i>Direct Anterior</i>	<i>Posterior</i>	<i>Anterior Supine Intermuscular</i>
Mean Cup Inclination	40.1° ^{6,8}	42.3° ^{9,11,17,19,21-23}	41.0° ^{9,11,17,19,21-23}	43.7° ¹⁵
Mean Operative Time	80 mins ⁶	98.6 mins ^{9,11,17,19-23}	93.6 mins ^{9,11,17,19-21}	82.3 mins ^{14,16}

Learning Curve

The Learning Curve of a Tissue-Sparing Total Hip Replacement Surgical Technique: a Multi-Centre Assessment.

Gofton W, Le D, Sciortino R, Cronin M, Parker A, Fitch D; EFORT Vienna; poster, Wednesday 31 May, 2017

Objective:

Evaluate the outcomes of the first 50 cases of four non-designer surgeons in three different countries (US, Canada, United Kingdom) with the tissue-sparing, supercapsular percutaneously-assisted total hip surgical technique.

Method:

Retrospective review Length of stay, transfusion rate, 30-day readmission rate, discharge status and complications data were collected.

Results:

The results suggest that the SuperPath® approach can be implemented by non-designer surgeons in different hospital settings, healthcare systems in different countries, and with annual volumes without an increase in complications.

The low discharge status (62%) in one centre is related to the surgeon's conservative approach in his initial cases, having older patient population, and patients traveling from another city for surgery.

Lack of thromboembolic complications or infections also agrees with previous reports from the designer surgeon.

Table 4 : Outcomes during the first 50 cases for each of the four non-designer surgeons

	<i>Community Hospital -US</i>	<i>Large Metro Hospital - US</i>	<i>University Hospital - Canada</i>	<i>University Hospital - UK</i>
Length of Stay	2.1 days	2.5 days	2.2 days	2.8 days
Transfusion (%)	0%	0%	6%	2%
30-Day Readmission Rate	2%	2%	4%	2%
Discharge				
Home	92%	62%	90%	100%
SNF	8%	2%	8%	0%
Rehab	0%	36%	2%	0%
Complications				
Dislocations	0	0	1 (traumatic)	1
DVT / PE	0	0	0	0
Wound Complications	0	0	0	0
Infections	0	0	0	0
Fractures	2	1	0	1

Economic Benefits

The SuperPath® technique claims to reduce several key factors associated with the economic burden of Total Hip Replacement (THR), such as Length of Stay (LOS), need for medications, transfusions, rehabilitation and 30-days readmission rate.

In-hospital costs for total hip replacement performed using the supercapsular percutaneously assisted total hip replacement surgical technique.

Chow J, Fitch D; International Orthop 2016, Nov 12

Objective:

Compare the in-hospital costs of this technique to all other THRs performed in a large hospital system in the United States.

Cohort:

Group A consisted of 419 SuperPath® procedures performed by a single surgeon. Group B consisted of 1673 procedures being of all the other THRs performed within the same center by 34 surgeons at nine hospitals in four states

Method:

The costing database for a large hospital system was retrospectively searched for all in-hospital costs associated to primary THA's performed between January 2013 and September 2015. The data was compiled in two groups. Costing information was collected for all the aspects of primary in-hospital stay.

Results:

Detailed results are reported in Table 5, with an overall patient costs being 15% higher in Group B. Looking at the 30-day readmission rate, there were two readmissions in Group A (0.4%) and 50 (2.9%) in Group B, the majority being for infection.

Table 5 : Per patient cost comparison between groups

Cost Category	Per Patient Percent Difference	P-Value
Overall Costs	Group B +15.0%	<0.000*
Implants	Group A + 2.8%	0.065
Costs excluding implants	Group B + 36.1%	<0.000*
OR Room	Group B + 17.3%	<0.000*
Anesthesia	Group B + 79.4%	<0.000*
Room and Board	Group B + 26.4%	<0.000*
Recovery Room	Group A + 12.8%	<0.000*
Physical / occupational therapy	Group B + 26.8%	0.005*
Pharmacy	Group B + 25.3%	<0.000*
Opioids	Group B + 49.2%	<0.000*
Imaging	Group B + 23.0%	<0.000*
Laboratory	Group A + 3.9%	0.147
ICU	Group B +45.0%	0.322
Transfusions	Group B +88.2%	<0.000*

* Significant Difference

- ▶ Results from current study shows 15.1% reduction in in-hospital costs with SuperPath®. The cost difference increased to 36.1% when implant costs were excluded.
- ▶ Reduction in anesthesia was possibly due to SuperPath® not requiring use of blocks or regional anesthesia.
- ▶ Operating room cost reductions could be due to decreased need for surgical assistants or for special equipment.
- ▶ Reduction in pharmacy costs was likely multifactorial: only oral medication in Group A, minimally invasive technique reducing pain levels and pain medications.
- ▶ Transfusion rates can also be multifactorial: reduced amount of damaged tissues and use of antifibrinolytics.
- ▶ Overall 91% of SuperPath® patients were discharged home, compared to only 29.6% of Group B patients.

In-hospital cost comparison between the standard lateral and supercapsular percutaneously-assisted total hip surgical techniques for total hip replacement.

Gofton W, Fitch DA International Orthopaedics March 2016, Volume 40, Issue 3, pp 481–485

Objective:

To compare the in-hospital costs associated with the SuperPath® and standard Lateral surgical techniques.

Cohort:

2 groups: group 1 were 49 SuperPath® and group 2 consisted of 50 Lateral THR's.

Method:

In-hospital costs for all SuperPath® THRs performed by one surgeon and all standard Lateral THRs performed by another at the same institution between April 2013 and January 2014.

Results:

The mean LOS for SuperPath® was 2.1 days (range, 1-4) and 5.1 days (range, 2-26) for the Lateral group.

The mean total in-hospital cost per patient in Lateral group were 28.4% higher than in the SuperPath® group. This is calculated as with the standard lateral approach, increased costs associated with transfusion (+92.5 %), patient rooms (+60.4 %), patient food (+62.8 %), narcotics (+42.5 %), physical therapy (+52.5 %), occupational therapy (+88.6 %), and social work (+92.9 %) are involved.

The only costs that was increased for SuperPath® were for imaging (+105.9 %), as with the SuperPath® technique, the surgeon performed intraoperative radiographs on all patients.

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Individual results and activity levels after surgery vary and depend on many factors including age, weight, and prior activity level. There are risks and recovery times associated with surgery and there are certain individuals who should not undergo surgery.



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