

TOTAL HIP ARTHROPLASTY

RISK FACTORS FOR DISLOCATION OF HIP

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ABSTRACT... Dislocation after total hip arthroplasty is part of spectrum ranging from neck impingement to subluxation before frank dislocation occurs. **Objectives:** To assess various parameters as potential risk factors for postoperative hip dislocation. **Setting:** Department of Orthopaedics in Merlin Park Regional Hospital, Galway **Period:** 5 years **Study Design:** Observational **Material and Methods:** In our study we reviewed 1096 patients who underwent primary total hip arthroplasty in a consecutive period of five years. We assessed various parameters as potential risk factors for dislocation. **Results:** During this period 16 (1.45 %) patients dislocated their hips. According to our study the important factors that led to these dislocations were Retroverted cup (5 cases), trochanteric malunion/ avulsion (5 cases), Epilepsy (1 cases), Confusion/ Dementia (2 cases) Parkinsonism (2 cases). Abduction angle was found to be greater than 50 degrees in 8 cases. **Conclusion:** Familiarity with the risk factors assists in prevention and dictates aspects requiring further assessment, when dislocation occurs. Protection of the hip by bracing should be considered following revision surgery but is of questionable use in primary cases.

Key words: Dislocation, Total Hip Arthroplasty.

INTRODUCTION

Instances of impingement or subluxation may be missed, whereas (except in rare cases) dislocation is usually quite dramatic with pain and inability to bear weight, bringing the patient to the immediate attention to the surgeon. The reported incidence of hip dislocation after total hip arthroplasty has ranged from 1-10 %. In various clinical series wide variety of factors have been implicated in the past in occurrence of postoperative hip dislocation.

These factors have continued to be investigated in various series (Morrey 1992, Paterno 1997, Woo & Morrey 1982.)^{1,5,2} and can be divided into patient factors and surgical factors. Patient's factors include age/sex, height/weight, medical history, and underlying hip condition and previous hip surgery. Surgical factors include the relative experience of surgeon, surgical approach, prosthesis design (acetabular cup design and degree of head capture, femoral component head size, head neck ratio and femoral offset), component orientation, limb length inequality, and trochanteric non-union or avulsion.

PATIENTS MATERIAL AND METHODS

In our retrospective study we reviewed 1096 patients who underwent primary total hip arthroplasty during the past five years. During this period 16 (1.4%) patients dislocated their hips. We assessed various parameters as potential risk factors for postoperative hip dislocation. An independent investigator collected all data.

Patients' personal details, age, sex, medical history and operative details were carefully collected from clinical notes and review of patients in out patients. Two observers were used to determine for component orientation, abduction angle, subsidence and protrusion studied Pre and postoperative radiographs. Mechanism and nature of dislocation were recorded accurately at the time of admission with dislocation. The mean age of patient who underwent operation was 71 years while mean age of patient who dislocated was 75 years. The male to female ratio of patients who underwent total hip arthroplasty was 620 and 476 respectively.

Out of 16 dislocations 9 patients were male while 7 were females. Six different consultant orthopaedic surgeons performed all of the hip arthroplasties. Four different approaches were used as shown in table below.

Table-I.

Approach	Total cases	Dislocated	%age	Prosthesis
Lateral	355	05	1.4%	Charnley
Lateral	250	01	0.4%	Exeter
Transtrochanteric	349	06	1.71%	Charnley
Posterior	142	04	2.8%	Charnley
Total cases	1096	16	1.45%	-

Charnley femoral prosthesis with long posterior wall acetabular cup was used in 846 cases while Exeter femoral prosthesis with Exeter low profile acetabular cup was used in 250 cases.

RESULTS

Out of the 16 dislocations, 7 were recurrent dislocations. Two patients dislocated within the hospital stay, 12 patients dislocated within 3 months of surgery and 2 patients dislocated after 18 months of surgery. All dislocations were posterior dislocations. One patient needed open reduction while rests of the patients were treated with closed reduction and traction till abduction brace was applied. Two cases needed adductor tenotomy while 5 cases needed revision hip arthroplasty. The important factors that led to these dislocations were shown in each case in the table II.

DISCUSSION

A wide variation of reported occurrence of dislocation after total hip arthroplasty exists in literature review by Morrey et al suggests a dislocation rate of 2.2%. At Mayo clinic the reported incidence of dislocation in 10,500 total hip arthroplasties is 3.2%. A wide variety of factors have been implicated as potential risk factors in literature. We have found no relative association of age and sex in postoperative hip dislocation. The mean age and sex of the patients who underwent total hip arthroplasty correspond with the patients who dislocated their hip after total hip arthroplasty. The underlying medical history of the patient with regard to neuromuscular conditions and mental confusion appears to increase the risk of postoperative dislocation (Paterno et al)⁵ In our study we have found Confusion/Dementia,

Epilepsy and Parkinsonism as potential risk factors in postoperative hip dislocation. In one past series condition like alcoholism, muscular dystrophy, senile dementia, uremic psychosis and cerebral palsy were present in 22% of patients with recurrent dislocations, compared with 14% in a control group (Fackler C D 1980 Clin. Ortho)¹⁷. Excessive alcohol intake was considered by Paterno et al⁵ as a major risk factor in their series. There is conflicting evidence in literature as to whether underlying hip condition effects the rate of dislocation. We have found that in our series previous history of fracture of neck of femur increased the risk of post operative hip dislocation in a multivariate analysis of 10500 total hip arthroplasties by Woo and Morrey² a higher post operative dislocation rate occurred with fracture (8.5%), congenital dislocation (7.5%), and avascular necrosis (4.5%), compared with an overall rate of 2.4%. The factor responsible is the significantly greater range of motion in the postoperative period. There is no doubt that surgical outcome in general is dependent on the relative experience of the operating surgeon. According to our observation the dislocation rate after total hip arthroplasty decreased with the relative experience of the operating surgeon. This fact was also highlighted in other studies study of 3199 Charnley total hip arthroplasties by Hedlundh et al⁴ in two Swedish centres showed a significantly higher dislocation rate of 8.1 % (p <0.05) when procedure was performed by surgeons in the first year of training compared with a rate of 3% when performed by others second Swedish study by Headland et al¹¹ of 4230 primary hip arthroplasties performed using the posterior approach at three centres revealed twice the number of dislocations with inexperienced surgeons. The frequency dislocation

leveled off with increasing number of operations and remained constant after approximately 30 cases. For every 10 primary cases performed annually the risk of dislocation decreased by 50%. It therefore appears that experience is an important factor in reducing the incidence of post operative hip dislocation. The exact

influence of surgical approach variable is controversial. Recently Hedlundh et al⁴ Studying the Charnley total hip arthroplasties, showed that overall incidence of dislocation was similar for the posterior approach (1361 patients) compared with (1838 patients), but there was a much higher rate of early dislocation (within 2 weeks)

Table-II. Risk factors

Age	Sex	Co-morbidity	Hip pathology	Approach	Cup design	Cup orientation		Troch. avulsion	Single/ recurrent
						Abd angle (degrees)	Cup position		
86	F	-	Osteo-arthritis	Posterior	OGEE LPW	58	Retroverted	-	Recurrent
84	F	-	As above	Posterior	As above	60	Neutral	-	Single
64	F	Confusion	As above	Transtroch.	LPW cup	61	Anteverted	Yes	Recurrent
64	M	Dementia	As above	Transtroch.	As above	46	Neutral	-	Single
71	F	-	As above	Lateral	Flanged LPW	45	Anteverted	-	Single
77	M	-	Bilateral THR	Lateral	OGEE LPW	50	Retroverted	-	Single
68	M	Parkinson's Disease	Osteo-arthritis	Transtroch.	As above	50	Anteverted	Yes	Recurrent
82	M	-	Bilateral THR	Lateral	Flanged LPW	52	Retroverted	-	Single
79	M	-	Bilateral THR	Transtroch.	OGEE LPW	40	Anteverted	Yes	Recurrent
84	F	-	Osteo-arthritis	Lateral	As above	36	Retroverted	-	Single
75	F	Parkinson's Disease	AMP to THR	Transtroch.	Large LPW	55	Anteverted	Yes	Recurrent
73	M	-	Bilateral THR	Lateral	Low profile	60	Retroverted	-	Single
68	M	-	DSH to THR	Lateral	Flanged LPW	40	Anteverted	-	Single
77	F	-	Rheumatoid arthritis	Posterior	OGEE LPW	54	Retroverted	-	Single
76	F	Epilepsy	Osteo-arthritis	Posterior	As above	50	Retroverted	-	Recurrent
76	M	-	As above	Transtroch.	As above	45	Retroverted	Yes	Recurrent

with the posterior approach. Others have found the approach to be a major influence. At the Mayo clinic², the posterior approach was associated with a significantly higher ($p < 0.01$) dislocation rate than the anterior approach.

The overall dislocation rate was 5.8% with the posterior approach compared with 2.3% with the anterior approach recent analysis of a modified direct lateral approach by oskal and Mann¹² reported no dislocation in primary cases and three dislocations in 115 Revision (2.6%) cases. We observed in our series that the surgical approach variable is not statistically significant risk factor. The dislocation rate with posterior approach as compared with other approaches was not statistically significant, however 3 out of 4 dislocations with posterior approach have recurrent dislocations. The relative contribution of the actual design of the acetabular cup, as opposed to its orientation after insertion remains largely unstudied.

Design of the cup in relation to the degree of head capture leads to increasing constraint, which is also dependent on the relative head neck ratio. The use of an elevation to the posterior wall of the acetabular cup was assessed in various studies. In the Mayo clinic experience of 5167 arthroplasties, an elevated-rim liner used in 2469 cases resulted in a 2-year probability of dislocation of 2.19% compared with 3.85% with a standard liner¹³.

Previously Charnley reported that a combination of keeping the socket low in the acetabulum and using a long posterior wall cup resulted in the dislocation rate from 0.8% in 3820 arthroplasties to 0.4% in 4706 arthroplasties performed after 1972 at Wrightington Hospital¹⁴. The angle bore socket designed for the Charnley prosthesis allows for increased superior and posterior head coverage and has reduced the incidence of dislocation in 400 revision cases from 15% to 2%¹⁵. In our series all total hip arthroplasties had long posterior wall cemented acetabular cups. This shows that other variables also play a part in postoperative hip dislocation, secondly any means used to augment the degree of coverage of the head by the cup, however, may lead to

impingement, which by generating increased torque causes earlier loosening of the acetabular component. Malposition of the components has long been recognised as an important factor in postoperative hip dislocation. Correct orientation of the cup is a particularly difficult aspect of the total hip arthroplasty. Lewinnek et al¹⁸ proposed a safe range of 15 degrees +/- 10 degrees of anteversion and 40 degrees +/- 10 degrees of abduction. According to him dislocation rate for cups orientated in this range was 1.5% as compared with a rate of 6% if cup orientation was outside this safe range ($p < 0.05$). Other researchers have since documented malposition of the components as a major cause of dislocation. However, Paterno et al⁵ have not found such a major association. In their series, radiographic analysis was performed for 32 dislocated total hip arthroplasties and compared with 32 procedures without dislocation matched for prosthesis type and operative approach.

There was no association between the version or abduction angle of the acetabular component. In fact, 30 of the 32 patients in each group had an abduction angle within the safe range as previously described by Lewinnek et al¹⁸. We have found in our series component malposition as a major risk factor in postoperative hip dislocation. Trochanteric osteotomy is still widely practised especially in revision surgery. Non-union of the trochanter with migration is associated with a much higher risk of dislocation and is an extreme example of loss of myofascial tension. In Warightington Hospital, Charnley and Cupic¹⁹ related 28% of 56 dislocations to trochanteric nonunion. In Mayo clinic experience, Woo and Morrey² reported an incidence of dislocation of 17.6% with trochanteric migration of at least 1cm and an incidence of 2.8% without migration. In our series 5 out of 6 (trantrochantaric approach) hip dislocations had trochantaric non-union/avulsion.

CONCLUSIONS

Dislocation is the most common clinically apparent complication of hip arthroplasty. The process of prevention should begin at the preoperative planning stage when realisation of the high risk of dislocation in certain situations may dictate a change in operative plan, for instance when there have been multiple prior

surgeries, prior dislocation, or neuromuscular problems. The surgeon should routinely check the position of the patient on the operating table prior to draping and align the patient in the desired position, without regard to the approach used wide variety of alignment guides are available to assist in positioning of the acetabular cup. However, all techniques depend on the surgeon's estimate of the position of the pelvis during surgery. The true acetabulum is a useful guide for placement of the acetabular component, except in-patients with severe hip dysplasia or marked osteophyte formation. The position of the femoral component is somewhat easier to reference with respect to the 90 degree flexed knee, lesser and greater trochanters. The acetabular component should be placed at least within the range of the 'safe' zone of 15 +/- 10 degrees of anteversion and 40 +/- 10 degrees of abduction¹⁸. Neither component should be placed in retroversion.

Familiarity with the risk factors assists in prevention and dictates aspects requiring further assessment, when dislocation occurs. Protection of the hip by bracing should be considered following revision surgery but is of questionable use in primary cases. Most dislocations occur early and can be reduced closed. Postoperative bracing is recommended, usually for a minimum of 3 months.

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REFERENCES

- Morrey B F: **Instability after total hip arthroplasty.** Orthop. Clin 1992; 23,2:237-248.
- Woo RYG, Morrey BF: **Dislocation after total hip arthroplasty.** J Bone Joint Surg Am 1982,64: 1295-1306.
- Etienne A, Cupic Z, and Charnley J: **Postoperative dislocation after Charnley low Friction arthroplasty.** Clin Orthop 1978, 132:19-23.
- Hedlundh U, Hybbinette CH, Fredin H: **Influence of surgical approach on dislocation after Charnley hip arthroplasty.** J Arthroplasty 1995,10:609-614.
- Paterno SA, Lachiewicz PF, Kelly SS : **The influence of patient related factors and the position of the acetabular component on the rate of dislocation after total hip Replacement.** J Bone Joint Surg Am 1997, 79:1202-1210.
- Kohn D, Ruhmann O, Wirth CJ: **Dislocation of total hip endoprosthesis with special reference to various techniques (in German).** Zeitschrift fur Orthopaedie und thre Grenzgebiete, 1997,135:40-45.
- Conventry MB: **Late dislocations in patients with Charnley total hip arthroplasty** J Bone Joint Surg Am 1985,67:237-248.
- Fackler CD, Poss R: **Dislocation in total hip arthroplasty.** Clin Orthop. 1980. 151: 169-178.
- Khan MA, Brakenbury PH, Reynolds ISR : **Dislocation following total hip replacement** J Bone Joint Surg Br 1981, 63: 214-218.
- Papandrea RF, Froimson MI: **Total hip arthroplasty after acute femoral neck fractures.** Am J Orthop 1996, 15:85-88.
- Hedlundh U, Ahnfelt L, Hybbinette CH, Fredin H: **Surgical experience related to dislocations after total hip arthroplasty.** J Bone Joint Surg Br 1996,78:206-209.
- Moskal JT, Mann JW: **A modified direct lateral approach for primary and revision total hip arthroplasty: a prospective analysis of 453 cases.** J Arthroplasty 1996,11:255-266.
- Cobb TK, Morrey BF , Ilstrup DM : **The elevated-rim acetabular liner in total hip arthroplasty : relation ship to postoperative dislocation.** J Bone Joint Surg Am 1996, 78:80-86.
- Etienne A, Cupic Z, Charnley J,: **Postoperative dislocation after Charnley low-friction arthroplasty.** Clin Orthop 1978, 132:19-23.
- Wroblewski BM: **Dislocation. In revision surgery in total hip arthroplasty: Springer-Verlag; 1990:29-46.**
- Hedlundh U , Carlsson AS: **Increased risk of dislocation with collar reinforced modular heads of the Lubinus SP-2 hip prosthesis.** (Letter) Acta Orthop Scand. 1996,67:204-205.
- Fackler CD, Poss R: **Dislocation in total hip arthroplasties.** Clin Orthop 1980,151: 169-178.
- Lewinnek GE, Lewis JL, Tarr R, Compere CL, and

Zimmerman JR: **Dislocations after Total hip replacement arthroplasties.** J Bone Joint Surg Am 1978,60:217-220.

19.

Charnley J,Cupic Z: **The nine-and ten year results of the low friction arthroplaty of The hip.** Clin Orthop 1973, 95:9-25.

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**“Always do right.
This will gratify some people and
astonish the rest.”**

(Mark Twain)