

Complications of delayed total hip arthroplasty following acetabular fractures. A systematic review of literature

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Abstract

Total hip replacement after failed initial management of fracture acetabulum may be associated with considerable morbidities and complications. The aim of this review is to collect and analyze the existing evidence related to results of total hip arthroplasty after acetabular fracture management and its pre-requirements and possible complications in English literature published between 1990 to 2017. A total of 16 articles met our inclusion criteria. Eight studies were retrospective and 2 were prospective studies. These included a total of 579 total hip arthroplasties with a mean age of 48 years and a mean follow up of 58 months. Different complications have been reported, including instability (4%), infection (1.6%), sciatic nerve injury (2.6%), heterotopic ossification (21%), symptomatic loosening (7%), and thromboembolic manifestation (0.2%). A total of 10% of cases have been revised. Total hip arthroplasty after acetabular fracture surgery remains a difficult procedure that has inferior outcomes compared with patients with primary osteoarthritis. Primary total hip replacement is a reasonable method of treatment of selected acetabular fractures in the acute setting in specific cases.

Key words

Acetabular fractures; hip arthroplasty, complications.

Conflicts of interest: None to declare.

Introduction

Total hip replacement after previous acetabular fracture is not a straight forward operation. Many authors have reported diverse clinical and radiographic outcomes after a total hip arthroplasty was performed to manage unsuccessful acetabular fracture management via ORIF or even conservatively. The diversity of the results is not surprising in the view of the heterogeneity of the fracture patterns and the diverse methods of primary fracture management. In most studies, the primary problem was the premature loosening of cups, infection, recurrent dislocation, sciatic nerve palsy and Heterotopic ossification [1-4].

The aim of this review is to collect and analyze the existing data related to results of total hip arthroplasty after acetabular fracture ORIF surgery and categorize the possible complications in literature published between 1990 and 2017.

Materials and methods

A systematic review of the literature was performed according to the Preferred Reporting Items for Systematic Reviews and Meta- Analyses guidelines [5], to identify the result of total hip arthroplasty after acetabular fracture surgery and its prerequisite and

possible complications. A search of the PubMed, Embase, and Cochrane was conducted using various combination of the keywords : (acetabular fracture), (Post traumatic arthritis), (total hip replacement after acetabular fracture) and (Complications). The limit was set regarding the year of publication to published articles between 1990 and 2017.

Two researchers scanned all the articles for title and abstract. Articles reporting about hip arthroplasty following either conservative management or operative fixation of traumatic acetabular fractures were included. Other inclusion criteria were: articles that were published in English language, full text articles, retrospective or prospective studies with minimum of 12 months follow up. Literature reviews, biomechanical studies, technical notes, letters to editors, and instructional courses were excluded. In addition, reference lists of the included articles were manually checked by the authors for missed studies.

Data were extracted, examined and analyzed to obtain information such as, patient demographics, mechanism of injury, type of fracture, time interval from the acetabular fracture to total hip arthroplasty, type of implant used, operative approach, and early and late complications and functional outcome. For each of the analyzed factors, the number of available studies and the number of relevant patients were recorded.

Results

The initial electronic search yielded about 118 Articles. After excluding book chapters, reviews, instructional courses and letter to editors, and after obtaining the full text articles only, a total of 16 articles meeting

the inclusion criteria (Tables 1, 2). Of the 16 studies, a total of 575 THA procedures have been performed as a delayed for 574 patients. Patients' demographic data have been presented in table 1, while complications have been presented in table 2.

Table 1

Study/Year	Type	Patients	Age	Follow up	Non operative	ORIF	Pre op score	Post op score
Zachary et al, 2015[6]	Retrospective	74	51 (25-75)	8 (2 – 23)	16	58	Not stated	Not stated
O.chemaly et al, 2012[7]	Retrospective	40	60(28-89)	30 (9-72)	12	28	Not stated	80.1
Giriraj et al, 2015[8]	Prospective	20	61 (50-71)	Not stated	Not stated	Not stated	Not stated	81
Mears et al, 2002[9]	Retrospective	57	69 (26-89)	8 (2-12)	Not stated	Not stated	Not stated	89
Anil et al, 2008[10]	Retrospective	32	51.5 (17-86)	48 (2-9.7y)	8	24	28	82
Romness et al, 1990[11]	Retrospective	55	56 (19-91)	88 (1-199)	42	13	Not stated	Not stated
Berry et al, 2002[12]	Retrospective	34	50 (19-78)	143 (120-192)	19	15	Not stated	Not stated
Lizaur et al, 2012[13]	Prospective	24	56 (28-77)	101 (60-180)	15	9	35	77
Khurana et al, 2015 [14]	Prospective	62	58 (31-90)	32 of 62 Had long follow up 48 m	Not stated	Not stated	Not stated	81
Bellabarba et al, 2001 [15]	Retrospective	30	51 (26-86)	63(24-140)	15	15	41	88 (47-100)
Weber et al, 1998 [16]	Retrospective	66	52(19-80)	112(24-240)	-	66	Not stated	Not stated
Javaheri et al 2016 [17]	Retrospective	7	42	45(39-52)	7 (5 mo after trauma)	-	42.5 ± 6.42	88.3± 7.27
Uvarovas et al 2017 [18]	Retrospective	14	Not stated	48-168		14	Not stated	Excellent improvement
Ortega et al 2017 [19]	Retrospective	24 (25 Hips)		49 (33-69)		14		92
Salama et al 2017 [20]	Retrospective	21	56.7 years (range 29–75 years)	Average duration of follow-up was 26 months (range 24–36 months).	4	17	WOMAC scale 63 (range 42–92) to	4 (range 0–19).
Nabil et al 2017 [21]	Prospective	14	52	Least 24	14		Harris 34	83

Table 2: Complications

Study	THR	HO	Dislocation	Infection	Sciatic nerve injury	loosening	Revision	Thrombo-Embolism	Death
(year)	NO.								
Zachary et al, 2015 [6]	74	32	1	2	1	13	11	-	-
O.chemaly et al,2012 [7]	40	15	-	-	-	-	-	-	-
Giriraj et al, 2015 [8]	20	2	0	1	1	-	-	-	-
Mears et al, 2002 [9]	57	6	1	-	-	0	1	-	-
Anil et al, 2008 [10]	32	14	1	1	8	3	6	0	-
Romness et al, 1990 [11]	55	-	-	1	-	7	7	-	4
Berry et al, 2002 [12]	34	-	3	1	-	2	9	0	0
Lizaaur et al,2012 [13]	24	0	1	-	1	-	4	0	0
Khurana et al, 2015 [14]	62	-	1	2	1	1	1	0	0
Bellabarba et al,2001 [15]	30	13	-	0	-	1	1	0	0
weber et al, 1998 [16]	66	26	3	0	1	9	10	1	-
Javaheri et al 2016 [17]	7	1		1					
Uvarovas et al 2017 [18]	14								
Ortega et al 2017 [19]	25							1 wheelchair	9
Salama et al 2018 [20]	21	2							
Nabil et al 2017 [21]	14	2							
Results	575	113	11	9	13	36	50	1	13
		20%	2%	1.70%	2.30%	6%	9%	0.17%	2.30%

Discussion

This systematic review tried to present the available data regarding the different complications of delayed THA following acetabular fracture management. Among all, heterotopic ossification and significant implant loosening was found to occur with the highest incidence, with a total revision of 9% after reviewing the results of 16 studies.

Surgical reconstruction has been established as the treatment of acute displaced acetabular fractures [22-25]. However, a large number of patients will eventually require a THA because of posttraumatic arthritis or femoral head osteonecrosis. Many studies described that approximately 15% of the patients will require a THA within 2.5 years after open reduction & internal fixation of an acetabular fracture regardless of the fixation method, and this has been reported to be associated with incomplete anatomical reduction, age greater than 55 years, prolonged hip dislocation, substantial posterior pelvic wall involvement, acetabular impaction or damage to the articular cartilage [23-26].

Due to the high number of patients requiring THA after osteosynthesis, the ability to perform both procedures during a single surgery is appealing. However, this may be demanding, requiring longer surgical times, increased blood loss and possibly separate surgical incisions. Furthermore, because THA is proposed for patients who have various co-morbidities, are over 65 years of age and in patients who have pelvic trauma, there is a high potential for severe complications [29]. This combined hip procedure may be done with caution.

When managing a complicated acetabular fracture with delayed THA, whether previous conservative treatment or ORIF were utilized, certain complications may have a higher incidence when compared to THA used in the nontraumatic setting. Heterotopic ossification (HO) has a reported incidence in the nontraumatic setting of 5 to 30% [30-33]. However, when THA is performed after an acetabular fracture, Chermaly et al. [7] reported an HO incidence of up to approximately 62%. In more recent studies, the incidence of HO ranged 9-43% (Table 2). Although HO usually occur in a mild form that doesn't require specific intervention, this complication may present significant clinical symptoms in advanced stages.

Another significant complication reported is implant loosening. The incidence of implant loosening in our review reached 18% in one study [6]. Aseptic loosening in this situation usually results from faulty components placement, wear, significant bone loss with insufficiency of the remaining acetabular bone stock

and recurrent subclinical instability. Care much be given to carefully plan for the surgery and render revision implants and materials available during surgery, for example pelvic rings, allografts or metal augments.

Another commonly reported complication is dislocation, with a reported rate that ranges between 0 and 9% (table 2). The highest dislocation rate was described by Berry et al. [12]. However, the authors did not offer a clear explanation as to why there was such a high dislocation rate among their cohort. The increased incidence of dislocation in this surgery may call for considering specific implants, for example dual mobility cups in this surgery.

Other complications such as neurologic injury, infection, thrombo-embolism have been reported with less incidence (table 2). Significant soft tissue scarring may increase the incidence of iatrogenic neurologic injury during surgery. Adequate exposure is needed during this surgery. Trochanteric osteotomy may be used to allow for adequate exposure and proper fixation of the implants.

As for clinical improvement, the hip scores used in the studies were presented differently. However, the improvement of clinical hip scores may signify the adequacy of THA in controlling patients symptoms. For this, utilization of acute THA in elderly patients with complex fracture acetabulum may offer a reasonable treatment option and minimizes the risks of prolonged inactivity and/ or the risks of a second surgery.

Conclusion

After reviewing the 16 articles and comparing the result of each, heterotopic ossification and implant loosening were found to be the commonest complications of delayed THA for acetabular fractures. Total hip arthroplasty in the setting of an acetabular fracture remains a difficult reconstructive issue. This population has inferior outcomes when compared with patients with primary osteoarthritis. Primary total hip replacement is a reasonable method of treatment of selected acetabular fractures in the acute phase specially in very complex acetabular fractures in elderly patients.

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