Clinical Outcomes of Lumbar Total Disc Replacement versus Anterior Lumbar Interbody Fusion

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Introduction

The existing data in the literature regarding comparative clinical outcomes after total disc replacement (TDR) versus anterior lumbar interbody fusion (ALIF) for lumbar degenerative disk disease (DDD) is still controversial. The authors performed a retrospective controlled cohort study of patients diagnosed with DDD who received surgical intervention (either TDR or ALIF).

Methods

TDR and control subjects were selected using the same inclusion and exclusion criteria. The authors evaluate clinical outcomes as measured by the Oswestry Disability Index (ODI) and the Visual Analog Scale (VAS) pain questionnaires preoperatively and at four standard post-operative follow-up time points: six weeks, three months, six months, and one year post-operatively. The authors also documented blood loss and return to work after 1 year for both groups.

Table 1

Baseline characteristics of Cases and Controls

Variable	*Cases*	*Control*	*P value*
	n=30	n=50	
Age Mean (Sd)	40.47 (8.12)	45.30 (7.97)	0.012
ODI (Total) Baseline Mean (Sd)	59.53 (9.91)	58.90 (17.18)	0.835
VAS (Back) Baseline Mean (Sd)	75.67 (14.70)	71.18 (15.98)	0.205
Gender			1.000
Male n (%)	15 (50.0)	25 (50.0)	
Female n (%)	15 (50.0)	25 (50.0)	
Level			0.020
L4-L5 n (%)	6 (12.0)	11 (36.7)	
L5-S1 n (%)	44 (88.0)	19 (63.3)	

Baseline demographic characteristics of cases and controls as well as VAS/back pain and ODI scores.

Results

At the univariate analysis, there were significant differences in back pain scores between the experimental and control groups at all time intervals except at baseline. TDR patients had significantly less back pain than patients who received spinal fusion (ALIF) starting at 6 weeks (Table 2). There was, a significant difference in the number of days to return to work between TDR and ALIF. There was no significant difference in the total amount of blood loss between both groups.

Table 2

Outcome measures for Cases and Controls

Variable	*Cases*	*Control*	*P value*
	n=30	n=50	
VAS-Back Pain			
Estimated Mean (sem)			
Baseline	75.67 (2.68)	71.18 (2.26)	0.205
6 weeks	24.52 (4.54)	43.97 (4.00)	0.002
3 months	15.53 (4.56)	41.97 (4.31)	<0.001
6 months	16.48 (4.15)	44.86 (5.50)	<0.001
12 months	22.36 (5.60)	45.52 (5.97)	0.007
ODI-Total			
Estimated Mean (sem)			
Baseline	59.53 (1.81)	58.90 (2.43)	0.835
6 weeks	30.53 (3.87)	41.00 (3.40)	0.047
3 months	24.80 (3.71)	44.33 (3.62)	<0.001
6 months	19.86 (3.79)	41.00 (4.67)	0.001
12 months	19.00 (3.52)	45.81 (6.04)	0.001
Return to Work Days Mean (sd)	90.43 (57.78)	155.89 (109.33)	0.011
Employment Status			0.119
Employed/retired n (%)	21 (80.80)	28 (62.20)	
Unemployed/disabled n (%)	5 (19.20)	17 (37.80)	
Blood Loss	154 (164.34)	125.71 (122.17)	0.419

Estimated means and 95% confidence intervals controlled for the covariate of age for the measured outcomes.

Conclusions

In our retrospective controlled cohort study patients submitted to TDR had significantly less back pain as well as lower disability scores than patients who received spinal fusion through ALIF. Although there were no significant statistical difference between either intra-operative blood loss or employment rates at 1-year follow-up between both groups, the 'time to return to work' after TDR were significantly lower than in ALIF patients.

Learning Objectives

- To understand the current level of evidence regarding the outcomes of the neurosurgical alternatives for treatment of lumbar degenerative disk disease.

- To understand the level of evidence and how the results or the present study suggest the possible superiority of TDR to ALIF in terms of back pain and return to work

References

1. Guyer RD, McAfee PC, Banco RJ, et al. Prospective, randomized, multicenter Food and Drug Administration investigational device exemption study of lumbar total disc replacement with the CHARITE artificial disc versus lumbar fusion: five-year follow-up. Spine J. 2009 ;9(5):374-86.

2.Lemaire JP, Skalli W, Lavaste F et al. Intervertebral disc prosthesis. Results and prospects for the year 2000. Clin Orthop Relat Res. 1997; I 337:64–76.

3. Tropiano P, Huang RC, Girardi FP et al. Lumbar total disc replacement. Seven to eleven-year follow-up. J Bone Joint Surg Am 2005;87:490–496