



Applying the Law of Levers to Reduce Atlanto-Axial Dislocation and Basilar Invagination: The Technique of Distraction, Compression, Extension and Reduction

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Introduction

Recent strategies for treatment of BI (basilar invagination) and AAD (atlanto-axial dislocation) are based on simultaneous posterior reduction and fixation. A new innovative technique of Distraction, compression, extension and distraction is described with 2 modifications: Joint remodelling (JRM) and extra-articular distraction (EAD)

Methods

Prospective study (May 2010-September 2014). Joint indices measured included (normal values): sagittal inclination, cranio-cervical tilt and coronal inclination. Surgical procedures included DCER alone (performed in SI <100 degrees, Group I) or JRM with DCER (in SI: 100-160 degrees, Group II) or EAD with DCER in severe BI with almost vertical joints (SI > 160 degrees, Group III). The technique was also applied for chronic displaced odontoid fractures (Group IV, n = 14)

Results

N= 93 (mean 22.5 years). All conventional indices improved significantly in the congenital cases (n= 79, p<0.001). CCT improved in all (p<0.01); Group I (n=32): 54+8.7 degrees (pre-operative 80.71±12.72 degrees); Group II (n=40): 58+7.0 degrees (pre-operative 86.5+14 degrees); Group III (n=7): 62+10.0 degrees (pre-operative 104+11.2 degrees). SI improved in both Group I and II. Follow-up (n=64, 29+8 months, Nurick's grade improved to 1.5+0.52 (pre-operative: 3.4+0.65; p<.0001). In patients with chronic displaced odontoid fractures (Group IV, n =14), all patients improved (mean Nurick's pre-operative: 4.07 +/- 0.8; post-operative score 1.3 +/- 0.4). Mean correction in effective canal diameter: 74.3 +/- 9.5 %; mean correction in actual canal diameter: 77 +/- 8.7%.

Conclusions

DCER is effective technique in reducing both BI and AAD. JRM and EAD with DCER useful in moderate-severe BI and AAD (with SI>100 degrees).

Learning Objectives

New technique to reduce BI and AAD from a posterior only technique

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