Paediatric Cranio-Cervical Junction and Cervical Spine Fixations: A Single British Institute Experience

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Aim: Compared to adults, paediatric cranio-cervical junction (CCJ) and cervical spine surgery has a predominance of complex congenital CCJ anomalies and metabolic disorders in causation. The associations of these anomalies including Chiari and syringomyelia are daunting and demand a multidisciplinary team (MDT) approach prior to any surgery. We report a series of over 50 cases of complex CCJ fixations, review their aetiology, peri-operative management and surgical outcomes.

Material: Over 15 years, 52 children (37 girls, 15 boys) with a median age of 8.8 years at surgery underwent 54 fixations.

Methods: Patient demographic data and operative details were analysed. Follow-up ranged from 6 weeks to 10 years. Surgical technique, complications and outcomes evaluated.

Results: The largest group of children had metabolic disorders/skeletal dysplasia (48%), CCJ anomalies (21%), trauma (11%), Downs syndrome (8%), and miscellaneous (10%). Some cases had multiple anomalies. 2 (4%) were revision surgery. 80% of operations had Intraoperative Neuromonitoring (IONM). Surgical complications occurred in 17% (9/54) with neurological deterioration in 6 % (3/54). 2% (1/54) had permanent deficit. There was no mortality.

Discussion: Significant cardiorespiratory and skeletal comorbidities warrant careful pre-op workup. Prior evaluation of nasopharyngeal airway capacity is critical in preventing a range of airway difficulties during and post-operatively. Adenoid surgery may be required prior to fixation. Post-op tracheostomy may follow.

The final biomechanical pathway in CCJ disorders involve either singly or in combination atlantoaxial instability, spinal cord compression with canal stenosis and spinal deformity. The anatomy in children with anomalies and or metabolic disorders is so abnormal that the bone structure and size do not allow for adequate purchase and fusion.

Conclusion: Despite major challenges and significant pre-op workup, paediatric surgical fusion for atlantoaxial instability, cord compression or deformity is safe when performed by an experienced team in specialised centres. Intraoperative IONM and a dedicated anaesthetic team, is critical in achieving good outcomes.

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