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Clinical and Radiological Outcomes Following Occipito-Cervical and C1/2 Fusion

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Background: Occipito-cervical (OC) & C1/2 fusion are techniques for managing cranio-cervical junction pathologies providing stabilisation and symptom relief. SPECT-CT imaging aids in isolating underlying pathology, optimising surgical planning. This study evaluates clinical and radiological outcomes of OC & C1/2 fusion, including the application of a novel C2 lateral mass screw technique.

Research Question: What are the clinical and radiological outcomes of OC and C1/2 fusions for cranio-cervical pathologies?

Design: Retrospective study of patients undergoing OC or C1/2 fusion by a single surgeon (2015–2024).

Methods: Data was collected on demographics, indications, functional scores, complications, and radiological parameters (atlanto-dental interval, atlanto-axial angle, atlanto-axial height, C0–2 Cobb angle, and evidence of bony fusion on CT at three months). SPECT-CT imaging was employed selectively to isolate pathology. For C1/2 fusion, joint drilling was performed without bone graft, and a novel C2 lateral mass screw technique was utilised in three cases.

Results: Forty-seven patients (27 female, 20 male; mean age 67) were included. Median Karnofsky Score: 80, Frailty Score: 3, Charlson Index: 4, with 27.7% smokers. OC fusion was performed in 25.5% (12/47). Indications: fractures (n=17), rheumatoid arthritis (n=16), myelopathy (n=4), and C1/2 joint pain (n=6). Median follow-up: 34.2 months. Pain significantly improved (VAS: 6 to 2), and NDI decreased (15 to 11). Radiological parameters improved (PADI: p=0.04; atlanto-axial height: p=0.02). Complications: metalwork revision (n=3), wound infection (n=3).

Discussion: OC & C1/2 fusion are effective for managing cranio-cervical pathologies, providing pain relief and preventing neurological deterioration with improved radiological parameters. SPECT-CT enhances diagnostic accuracy, while refined techniques, including the novel C2 screw, contribute to favourable outcomes with low complication rates.