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BACKGROUND: Plastic surgeons have played an integral role in the care and recovery of casualties wounded in combat through complex wound management, craniofacial reconstruction, and regenerative medicine. Declining case volume and the subsequent lack of readiness for Department of Defense surgeons being immediately deployable has been an increasing concern over the last five years.1,2 Little is known about DoD plastic surgery case volume. The purpose of this study was to quantify the volume of plastic surgery cases performed at military treatment facilities (MTFs) and in direct and purchased care settings during fiscal years (FY) 2016-2019.

METHODS: A list of plastic surgery Common Procedure Terminology (CPT) codes was compiled to encompass common elective therapeutic (‘tracer’) and reconstructive (‘readiness’) surgery procedures. The Military Health System (MHS) Data Repository was queried from FY 2016-2019. A geospatial map was created to illustrate where each of these procedures were being performed and at what volume in relation to MTF and purchased care. Using these data, plastic surgery case volume was determined by Defense Health Agency (DHA) market.

RESULTS: From FY 2016-2019 a total of 85,191 cases meeting criteria were identified during this time period. Readiness cases comprised 31.6% (n=26,950) while tracer cases were 68% (n=58,241) of the cases performed. Overall, 83.2% (n=70,854) were purchased care. A total of 1,397 (1.6%) readiness cases were performed at the MTF’s, and 25,553 via purchased care (30%), while 12,940 tracer procedures (15.2%) were performed at the MTF’s, and 45,301 via purchased care (53.2%). San Antonio (n=223), San Diego (n=216), and the National Capital Region (n=122) had the highest volume of readiness cases over the four-year period.

CONCLUSION: As an overall trend, plastic surgery volume within MTFs has declined over the past several years. DHA MTF’s with high numbers of purchased care should be considered for the consolidation of plastic surgery resources and manning, and other strategies developed to recapture purchased care in the MHS. Like other surgical specialties, civilian partnerships would likely benefit plastic surgeons in preparation for combat deployments.3

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TRACK: CRANIOMAXILLOFACIAL/HEAD AND NECK
A Retrospective Cohort Study of 5-Year Aesthetic Outcomes: Fronto-orbital Distraction Osteogenesis Versus Fronto-orbital Advancement & Remodeling

Presenter: Dillan Villavisanis

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INTRODUCTION: Unicoronal craniosynostosis (UCS) phenotypically presents with ipsilateral frontal and parietal bone flattening, supraorbital rim elevation and recession, temporal retrusion, palpebral fissure widening, and vertical orbital dystopia – known as the ‘harlequin deformity.’ Fronto-orbital advancement and remodeling (FOAR) is currently the most common surgical approach for UCS, although outcomes suggest high rates of ocular dysfunction, failure to achieve long-term aesthetic normalcy, and relapse over time. Fronto-orbital distraction osteogenesis (DO) is an alternative treatment for UCS, with literature suggesting improved anterior cranial base deviation, decreased perioperative morbidity, and lower rates of ocular dysmotility. This study compared long-term objective photogrammetric aesthetic and postoperative outcomes of patients with UCS treated with DO and FOAR.

METHODS: Patients presenting with non-syndromic UCS between 2007 and 2021 undergoing DO were compared to a matched cohort of patients undergoing FOAR. Clinical
photographs and ImageJ were used to quantify palpebral fissure height and width, pupil-to-brow distance (PTB), and margin-reflex distance (MRD1) in pixels. The formula symmetry ratio = \(-\frac{1 - (s/n)}{100}\) was used to compare synostosed (s) and nonsynostosed (n) sides, where a symmetry ratio value of ‘0’ indicated perfect symmetry, and lower (more negative) symmetry ratio values indicated increased asymmetry. Positive differences in pre- and postoperative symmetry ratios indicate improved symmetry. The difference in canthal tilt angles was calculated with canthal tilt angle = |(s - n)|. Whitaker classification was assigned in a blinded fashion by two attending craniofacial surgeons. Statistical analysis was performed with unpaired t-tests.

RESULTS: Forty patients (ten males) were included. The average age at surgery for FOAR and DO groups was 9.4 vs. 6.5 months (p < 0.001) and average length of follow up was 6.0 vs. 5.1 years (p = 0.456), respectively. Photogrammetric analysis and unpaired t-tests demonstrated significantly improved postoperative symmetry in the DO cohort for palpebral width [FOAR: -2.24, DO: 3.07 (p = 0.020)], MRD1 [FOAR: -9.92, DO: 12.87, (p = 0.045)], and canthal tilt [FOAR: 0.97°, DO: 6.54°, (p = 0.010)]. Analysis did not reveal significant symmetry ratio improvement in palpebral height (p = 0.157) and PTB (p = 0.202) between DO and FOAR cohorts. Unpaired t-tests revealed no significant difference in Whitaker Classification scores between DO and FOAR cohorts, with average scores of 1.97 ± 0.56 and 1.78 ± 0.54, respectively (p = 0.394).

CONCLUSION: Photogrammetric analysis of the periorbital region in UCS patients five years after surgery reveals significant improvement in those treated with both FOAR and DO, with DO patients demonstrating superior results in palpebral width and canthal tilt symmetry. However, patients treated with DO achieved similar Whitaker Classification compared to their FOAR counterparts. It will be important to continue to follow these cohorts to craniofacial maturity prior to making any definitive conclusions.

TRACK: CRANIOMAXILLOFACIAL/HEAD AND NECK
A Novel Angle to Reliably Diagnose Sagittal Craniosynostosis

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PURPOSE: Premature closure of the sagittal suture causes restricted growth perpendicular to the suture line and compensatory changes including temporal narrowing, frontal bossing, occipital bulleting, scaphocephalic head shape, and lowering of the vertex. This study assesses the ability of a novel photogrammetric diagnostic angle, largely based on cranial vertex position, to reliably distinguish sagittal craniosynostosis (SS) from control and false positive cases (SNS).

MATERIALS AND METHODS: All head CT imaging at our institution between 2014-2020 was reviewed for patients with sagittal synostosis (SS, n = 177), presumed sagittal synostosis with normal imaging (n = 30), and controls (n = 100). A novel measurement reflecting the anterior-posterior location of the vertex was measured by an angle drawn between the cranial vertex, nasion, and opisthocranion (VNO) in profile view with the head in a neutral position. This VNO angle was measured on 307 3D head CTs and 172 lateral clinical photos using NilRead Viewer and Microsoft PowerPoint respectively. Cranial index (CI) was measured on axial pre-operative head CTs. A threshold to determine maximum diagnostic sensitivity and specificity of the VNO angle was established based on receiver operating characteristic (ROC) curve analysis. Logistic regression was used to assess the ability of VNO angle to predict true SS diagnosis.

RESULTS: Mean age at pre-operative head CT was 9.5 months for the SS cohort, 4.2 months for the SNS cohort, and 8.9 months for controls (p=.327). Mean age at pre-operative clinical photo was 9.5 months for the SS cohort and 4.2 months for the SNS cohort (p=.149). The average VNO angle measured on clinical photos was 54.7° ±3.8° for the SS group, 43.1° ±2.2° for the SNS group, and 41.1° ±3.7° for controls (p<.001). Pearson correlations revealed no significant association between VNO angle and age at scan or age at clinical photo for any group (p = .232 - .924). Evaluation of standardized clinical photos revealed frontal bossing in 66% of SS patients (n = 104), 17% of SNS patients (n = 3), and zero controls. Occipital bulleting was present in 43% of SS patients (n = 83), 33% of SNS patients (n = 6), and zero controls. Receiver operating characteristic (ROC) analysis yielded a cut-off of ≥ 50° to identify SS. Diagnostic sensitivity and specificity were 96.6% and 99.2% respectively. Lastly, a logistic regression analysis to investigate the ability of a VNO angle ≥50° to predict a diagnosis of SS revealed a 95.3 times greater likelihood of having sagittal