

Prediction of Traumatic Carotid-Cavernous Sinus Fistula via Non-Contrast CT by Fracture Pattern and Abnormality of Venous System

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Introduction

Traumatic carotid-cavernous fistula (tCCF) is infrequent but with high morbidity if delayed diagnosed or managed. The diagnosis is mainly achieved by clinical suspicion and confirmed by radiological modalities. Due to lack of screening criteria and requirement of advanced and invasive radiological examinations, diagnosis is often delayed or underdiagnosed.

Methods

Patients with craniofacial trauma in a tertiary referral center were included from January 2004 to December 2014 and selected by International Classification of Diseases, Ninth Revision code 900.82 with confirmation by angiography. A matched case-control study with univariate and multivariate analysis was conducted to predict tCCFs. Forty-six patients diagnosed with tCCFs were included and matched with 138 patients of craniofacial trauma without tCCF as control at a ratio of 1:3. To eliminate the bias, two cohorts were matched according to age, gender, Abbreviated Injury Scale (AIS) of head and face, and Injury Severity Score (ISS).

Results

The diagnostic diameter of superior ophthalmic vein (SOV) in tCCF was 4 mm with area under curve of 0.89. The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were 71.4%, 92.1%, 81.1%, and 87.2%, respectively. In multivariate analysis, engorgement of SOV and cavernous sinus (CS) (OR: 35.39, p < 0.001) and lateral impact (ipsilateral temporal and sphenoid sinus fractures) (OR: 3.96, p = 0.028) were identified significant, whereas basilar skull fracture (OR: 1.58, p = 0.300) and injuries to ocular nerves (CN III, IV, and VI) (OR: 1.77, p = 0.055) were insignificant.

Conclusions

Presence of SOV or CS engorgement and lateral impact predict were demonstrated as independent predictors to tCCF and warrant further radiological evaluation. Injury to ocular nerves is not predictive but as an essential differential diagnosis with reversible outcome.

Learning Objectives

In order to provide a guide for trauma clinician to detect tCCFs timely in the population of craniofacial trauma.

References

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