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Radiographic study to assess the reliability of the Gillies approach for biopsy of the superficial temporal artery

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Abstract

Biopsy of the superficial temporal artery is often used in the diagnosis of giant cell arteritis, but at traditional sites there is a risk of injury to the facial nerve. Recently the Gillies incision has been suggested as an alternative means of access for the biopsy, but the anatomical basis of this has not been fully elucidated. We therefore undertook a radiographic review of 150 patients, and examining 300 vessels, to find out. Our results indicated that there is considerable variability in the position of the bifurcation of the superficial temporal artery, and so a Gillies approach may not be reliable, particularly if access to the bifurcation is required.

Keywords: superficial temporal artery; Gillies approach; giant cell arteritis; bifurcation; anatomy; frontal; parietal; temporal

Introduction

Biopsy of the superficial temporal artery (STA) is used to aid the diagnosis of giant cell arteritis, and has usually been taken from the preauricular region or through an incision in the lateral forehead. However, these sites have risks, both of scarring and injury to the facial nerve.

Alternative sites have been suggested for biopsy to reduce the complications associated with the traditional approaches, one of which is through a Gillies temporal incision.[1] The 2 cm incision is placed 2.5 cm anterior and superior to the helix within the hair-bearing area of the temporal scalp.

Reported advantages include the familiarity of the approach (the Gillies incision is often used in the management of zygomatic fractures); the low risk of injury to the facial nerve; and less conspicuous scarring.[1] It has also been suggested that because the measurements are carefully made, the need for identification of the vessel with Doppler ultrasound is unnecessary, and it provides ready access to the bifurcation of the frontal and parietal branches of the artery.[1] However, we know of no studies to date that have evaluated the bifurcation of the STA relative to the site of the Gillies incision.

The aim of this study, therefore, was to investigate radiologically the anatomical position of the bifurcation of the frontal and parietal branches of the STA to assess the likely reliability of the Gillies approach in providing access for biopsy.

Methods

Data about the location of the bifurcation of the STA was collected from computed tomographic (CT) cerebral angiograms taken over a four-month period at a tertiary hospital. Scans were excluded if the STA could not be evaluated satisfactorily (such as when there was inadequate contrast

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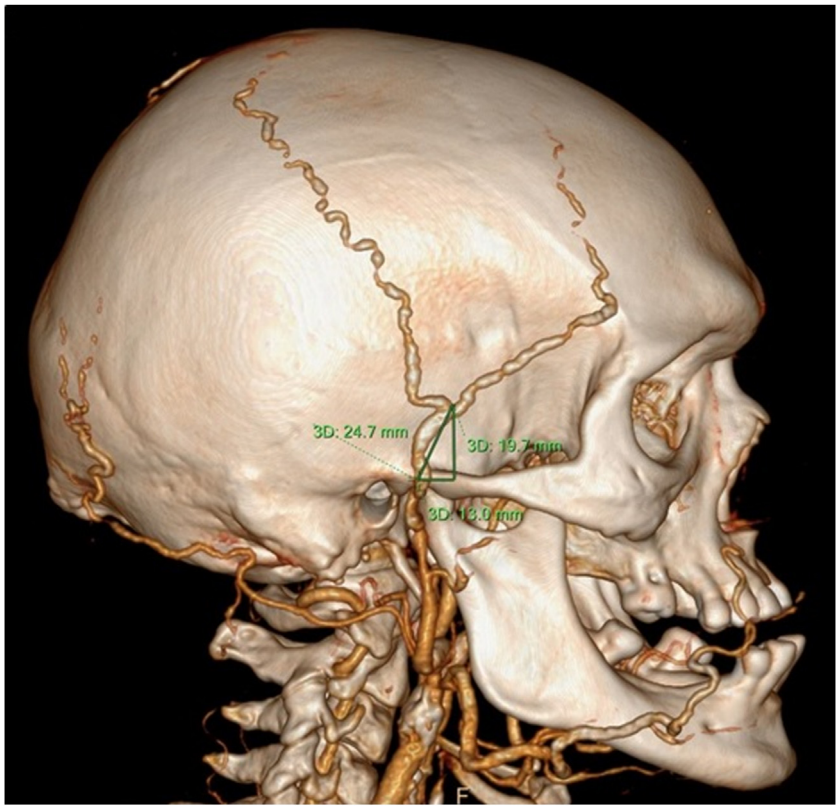

Fig. 1. Example of identification of the bifurcation of the superficial temporal artery and a) horizontal measurement b) vertical measurements from the superior edge of the root of the zygoma.

enhancement, or the STA was poorly visualised because of a movement artefact). Cases with evidence of trauma or previous operation in the temporal region were also excluded. Data collected included patient's age and sex and, when a bifurcation between the frontal and parietal branches was present, the vertical and horizontal distances of the bifurcation from the chosen bony and soft tissue landmarks described below. Measurements were collected on the scans of 150 patients, and 300 vessels were studied.

To ensure accuracy, all measurements were made by a single investigator based on 3-dimensional CT angiograms using a method similar to that described for the assessment of the STA by Kim et al.[2] Before measurements were made, scans were aligned with the Frankfort horizontal and true vertical planes using a grid tool within the radiology software, Philips IntelliSpace Portal version 6.0 (Supplementary Images 1 and 2). The gridlines were then removed and vertical and horizontal measurements were recorded from both the left and right sides (Fig. 1). Measurements were made to the nearest millimetre using the callipers on the Intellispace software. The root of the zygoma was chosen as a bony landmark as it is readily identifiable radiographically, clinically palpable, and typically within the surgical field during biopsy of the STA.

To ensure consistency in data collected for measurements made relative to the root of the zygoma, the most superior point of the zygomatic arch overlying the deepest curvature of the glenoid fossa was used as the reference point for bony measurements. The anterosuperior portion of the root of the helix, specifically the most anterior point where the helix joins the scalp, was chosen as the reference point for soft tissue measurements as this point was readily identifiable on imaging and approximates to the helical reference point for the orientation of the Gillies incision. Measurements anterior to the relevant landmark were assigned a plus value, as were measurements superior to stated landmarks. Measurements posterior to the specified landmarks were assigned minus values, as were those inferior to the landmark being considered.

Approval for the project was granted by our hospital's Human Research Ethics Committee.

Results

One hundred and fifty patients, 77 male and 73 female, were included in the study. The mean (range) age was 67 (23–91) years. A summary of the results is given in Table 1.

Overall, the mean (range) vertical distance to the bifurcation was 15.2 (−14 to 45) mm superior to the root of the zygoma, while the mean (range) horizontal distance to the STA bifurcation was 0.26 (−17 to 22) mm anterior to the root of the zygoma. Of the 300 vessels studied, the bifurcation of the STA was seen at or below the level of the zygomatic

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