Entry Point to the Sylvian Fissure for the Pterional Transsylvian Approach in Aneurysmal Subarachnoid Hemorrhage

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Abstract

Background: Although the anatomy of the Sylvian fissure is understood, there is little information where to start its dissection in the Pterional Transsylvian (PT-TS) approach.

At small craniotomy using the PT-TS approach, we set the entry point to the Sylvian fissure at 15mm behind the anterior edge of the craniotomy along the Sylvian fissure and designated this site “point 15.” Here we compared the utility of point 15” with the Sylvian point (point on the Sylvian fissure giving rise to the horizontal and anterior ascending rami) that had been recommended earlier as the entry site for opening the Sylvian fissure.

Material and Methods: This study includes 15 patients with ruptured anterior circulation aneurysms. We evaluated the usefulness of “point 15” in the PT-TS approach for aneurysmal neck clipping with respect to the adequacy of anatomical exposure and low invasiveness.

Results: In 8 patients “point 15” provided for excellent anatomical exposure of the Sylvian fissure; complete neck clipping was possible with minimal brain retraction and damage.

Conclusions: The “point 15” was an easily set entry point to the Sylvian fissure. It provided for sufficient anatomical exposure at surgery for anterior circulation aneurysms.

Key Words: Sylvian fissure – Entry point – Transsylvian approach.

Introduction

PTERIONAL-transsylvian approach is used to treat pathologies arising from the circle of Willis and its vicinity. In the PT-TS approach, delicate Sylvian dissection and opening of the Sylvian fissure are key for successful operations [1]. Wide splitting of the Sylvian fissure increases surgical exposure and reduces the working distance between the surgeon’s hands and the anatomic structures in the region of the circle of Willis [2]. Despite detailed descriptions of the anatomy of the Sylvian fissure [3-5] there are few clear suggestions on where to start the dissection of the Sylvian fissure in the PT-TS approach [2-8]. According to Yasargil, the Sylvian cistern is entered at the level of the opercular frontal gyrus [2]. Türe et al., suggested that the “Sylvian point” can be used as a starting site to open the Sylvian fissure [8]. The superficial part of the Sylvian fissure is divided into a stem and three rami [8,9]. At the level of the pterion, the stem gives rise to the anterior horizontal and ascending ramus and the posterior ramus [9]. These rami define three parts of the inferior frontal lobe, the pars orbitalis, triangularis and opercularis. The confluence of these three rami is known as the “Sylvian point” [8].

Patients and Methods

The admission, progress notes and outcome data of 15 patients with rupture anterior circulation aneurysms requiring surgical clipping through pterional transsylvian approach were collected prospectively and retrospectively in. All these patients were admitted to the Neurosurgery Departments in Cairo University Hospitals from July 2013 to July 2014.

We have started using a small craniotomy for the clipping of anterior circulation aneurysms. In that procedure we set the entry point to the Sylvian fissure 15mm behind the anterior edge of the craniotomy on the Sylvian fissure and named this point “point 15” [10]. Here we evaluated the usefulness of “point 15” in the PT-TS approach.

With the patient supine and the head elevated 10 degrees to ensure its position above the level of the heart.
The head is rotated 20 to 45 degrees away from the side of the craniotomy for MCA aneurysms, the rotation in Internal Carotid Artery (ICA) and Anterior communicating Artery (AcoA) aneurysms, it is 30 to 45 degrees. A curvilinear skin incision is made and the scalp is reflected in a single layer. After one-layer elevation of the skin and temporal muscle, three or four bur holes, including a Mac-Carty key burhole, are made for frontotemporal craniotomy [11]. The sphenoid ridge is drilled to the depth of the lateral end of the superior orbital fissure with a high-speed drill to gain a flat approach [12]. The dura is opened in a semicircular fashion around the Sylvian fissure. This dural opening exposes the inferolateral aspect of the frontal lobe, the Sylvian fissure and the superior temporal lobe.

Clinical case:

67 female patient came to Casualty Department with DCL, the patient was hypertensive not controlled by the history taken from relative, CT angio showing left MCA aneurysm. HH grade II, Fisher grade III.

Operative details:

- Craniotomy was done, and opening the dura.
- Opening the sylvian fissure at the point 15 and continue the dissection from distal to proximal.

- Identification of branches of MCA, deep sylvian veins encountered at the end of the fissure dissection overlying the M1 segment are often small and were divided. Large deep sylvian veins should be mobilized temporally and preserved.

Once cut, the Sylvian fissure split is completed and the vasculature can be followed from the supraclinoid ICA to the MCA bifurcation.

- Sylvian fissure dissection, providing some brain relaxation, and self-retaining retractor facilitate final dissection around the aneurysm and identification of the neck.

Fig. (1): Intraoperative photograph demonstrating the distance between the sphenoid ridge and entry point to Sylvian fissure.

Fig. (2): CT Angio showing left MCA aneurysm.

Results

Detection of sylvian point only in nine patients (60%) because of subarachnoid hemorrhage and congested veins in Sylvian fissure.

We have in this study seven patients with MCA aneurysms (46.7%), five patients with A-com aneurysms (33.3%) and three patients with supraclinoid aneurysms (20%).

Only eight patients (53.3%), the surgeons started dissection at point 15 because most of surgeons
prefer to identify and open the opticocarotid cistern, establish proximal control, then work along the ICA from proximal to distal, splitting the fissure and working along the M1 segment or complete distal Sylvian fissure dissection to identify M2 or M3 vessels distal to the aneurysm. However surgeons who start dissection at point 15 confirmed optimum splitting of Sylvian fissure at this point.

Timing is very important determining factor before clipping regarding the vasospasm that affect on the outcome intra-and postoperative.

- We have four patients (26.6%) before 3rd day of SAH and 11 patients (73.3%) with vasospasm.
- The surgeons prefer to achieve optimum splitting of Sylvian fissure by starting dissection at point 15 in these four patients before the vasospasm and we had two patients (13.3%) without preoperative vasospasm develop postoperative vasospasm in MCA branches that confirmed clinical with weakness in contralateral side.
- Other four patients (26.6%) were already in vasospasm where the surgeons achieved optimum splitting of Sylvian fissure by starting dissection at point 15.
- So vasospasm is important determining factor that may limit the opening of Sylvian fissure by starting at point 15 because we have 50% of patients without vasospasm developed postoperative vasospasm, however four patients operated while they were in vasospasm already.

Discussion

Türe et al., suggested that the “Sylvian point” can be used as a starting site to open the Sylvian fissure [8]. As the aperture of the Sylvian fissure is slightly wider at the Sylvian point, this site has been recommended as the starting site for Sylvian fissure dissection. However accurate intraoperative identification can be difficult due to anatomic variation and covering vessels particularly in patients with rupture aneurysm [13] and identification of sulcal structure is difficult because the tight brain and thick arachnoid layer, so point 15 was set as a guide to start the surgical corridor to the basal cisterns and surgeons who start dissection at point 15 confirmed optimum splitting of Sylvian fissure and the surgeon who started dissection at point 15 confirm good exposure and dissection as a good entry point to sylvian fissure [13].

Manipulation of the MCA branches may cause postoperative vasospasm [2,14].

Conclusion:

Point 15 is a good entry point for the Sylvian fissure that reach to the anterior circulation aneurysms and basal cisterns even with aneurysmal subarachnoid hemorrhage that make dissection difficult when starting from Sylvian point.
References


