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Technical Note

Necessity is the mother of invention: Technical note on the use of self-designed low-cost continuous sump suction for use in microvascular anastomosis

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ABSTRACT

Background : Technical advances in microneurosurgery facilitated the continuous evolution of surgery. In many developing countries surgeons face difficulties rendering high quality services due to resource constraints. The continuous dry surgical field is essential for performing microvascular anastomosis. Commercially available sump suctions are costly and beyond the reach of most surgeons in resource-constrained countries.

Methods: We designed a suction system which functions on the principles of capillary action and sump effect.

Results: The improvised sump suction was used successfully in our patients for micro vascular surgery, giving us a continuous dry field and removing the chance of error by an assistant.

Conclusion: The suction system was made with the use of easily available low-cost components, and worked well to the satisfaction of the surgeon.

Keywords: Capillary sump suction, Microanastomosis, Sump suction

INTRODUCTION

It is difficult to imagine the marvels of modern microneurosurgery without concomitant technological advancements. However, universal availability of advanced technology and equipment is sometimes hindered by patent rights, approval from government-regulating bodies, and cost. In many developing countries, surgeons face trouble in rendering state-of-the-art modern patient care due to the resource constraints. This is despite the fact that the need and principles of surgery are universally same. We have designed a suction system which can be easily assembled with commonly available components and used with efficacy to provide continuous dry surgical field for microvascular anastomosis.

MATERIALS AND METHODS

This system was made using tissue dilator of pediatric central line, suction catheter, and suction tubing. [Figure 1; Panel a] Multiple small holes are made in the tissue dilator to improve the functionality and prevent blocking of the suction system. [Figure 1; Panel b] The assembly

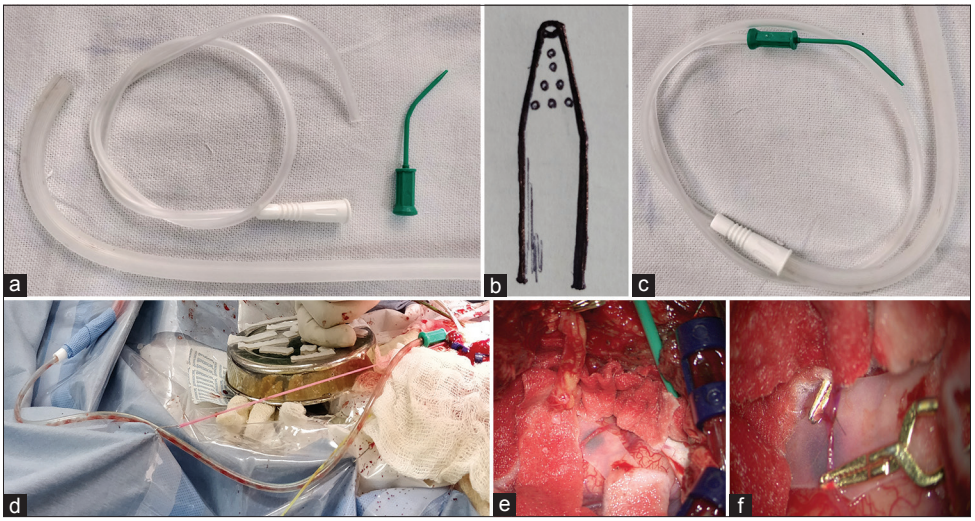

Figure 1: Panel a: Disposable suction tubung, dispoasble suction catheter and tissue dilator of pediatric central line. Panel b: Multiple small holes on the tissue dilator. Panel c: completed assembly . Panel d: Assembly placed near the operating site without interfering with the operative set up . Panel e: surgical site surrounded by cotton patties and the tip of tissue dilator placed over patties. Panel f: Resultant dry surgical field.

[Figure 1; Panel c] is then placed at convenience of surgeon near the operating site. [Figure 1; Panel d] Surgical site is surrounded by cotton patties, and the tip of the tissue dilator is placed sandwiched in the cotton patties. [Figure 1; Panel e and f] The suction system is connected to controlled suction device, and the pressure is modulated.

DISCUSSION

Microvascular anastomosis for intracranial vessels was first described by Yasargil in 1967.[3] While the principle of anastomosis remains same, availability of finer sutures, swaged needles, microforceps, microneedle holder, and bayoneted microinstruments has made the results much more favorable. Vision remains of paramount importance to precisely place the microsutures. Continuous cerebrospinal fluid (CSF) flow and even small amount of blood in the operative field act as a deterrent to a good anastomosis. This surgery is unique, in that neurosurgeon does not hold suction in any hand while performing anastomosis, and this job is entrusted to an assistant. This may not be the perfect situation as the assistant surgeon is seldom as ergonomically placed as the chief surgeon, and any clumsy movement can disturb or yank out the anastomosis. The Spetzler MicroVac suction tubing (P.M.T. Inc., Hopkins, MN) is one of the suction systems designed to place under the site of anastomosis to meet this need of continuous suction.[2] The commercially available sump suctions are costly, and easy availability remains in issue.

We describe a suction system which is made up of components which are easily available and can be simply assembled. The suction system can be placed away from the anastomosis site according to the ease of surgeon. Tip of the suction device and operative field is covered with cotton patties. Essential features of this suction system are that it is continuous, low-pressure suction which exploits capillary action of cotton patties.

Similar continuous suction device described by Koyama *et al*. in which a silicon catheter was placed outside the dura and was better suited to address extradural sources of blood. After the use of this system, the authors reported a significant reduction of anastomosis time.[1]

Our device system is placed inside the Dura. It not only addresses the small extradural bleeds but also helps in aspirating CSF and saline which is used intermittently. The advantages of our system are that it can be placed little away from anastomosis site thus obviating the danger of inadvertent pull on the anastomosis site. The blood, CSF, and saline can be easily sucked by a low-pressure continuous suction. This is achieved by capillary action of cotton patties. These patties make a continuous chain from the anastomosis site to suction tip.

Before the use of this suctioning system, we used to take the help of assistant surgeon intermittently doing suctioning in the field. Due to the magnification required for microvascular anastomosis, even small movements would disturb the operating surgeon. By using continuous capillary sump suction system, operating surgeon can perform microvascular anastomosis independently and reduces the ischemic time by reducing the time lost to clear the field. The present device utilizes the principle of capillary action, and surgeons can modify the elements of the device according to the availability.

CONCLUSION

The capillary sump suction system can be assembled with components which are easily available with low cost and facilitates microvascular anastomosis. This technique can be applied to microanastomosis of nerves and by other disciplines such as reconstructive surgery for free flap transfers.

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Conflicts of interest

There are no conflicts of interest.

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