

New and Improved Suction Tip and Retractor/Aspirator Designs for Surgical Fields

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The surgical retractors are integral parts of almost any surgery. Surgical aspirators were introduced into the surgical field after the development of powered suction devices. This new suctioning power improved the visibility of the surgical fields tremendously. The retractors being the aid in access to surgical field come in numerous shapes and sizes for various procedures. In the recent past, the combination of fiber optics and retractors and suction/retractor combination were introduced to surgical specialties. But, the suction components have been a separate tubes attached to the retractor with only one hole to evacuate mostly smoke. The tip of such suction devices never reaches the bed of the surgical field to remove any fluid. The notion of clear surgical field for operation is desirable by the operators. This requires adequate access and visibility as well as void of blood and other fluids. However, these goals are not always achieved in various surgical fields due to limited space and are hard to keep the entire field void of blood, fluid, smoke and debris.

The Hajarian surgical Retractors/aspirator and Retractor/Aspirator tip™ have shown significant improvement of the evacuation of fluid, debris and smoke from various surgical fields (Fig. 1). The simultaneous retraction and aspiration also have virtually eliminated the need for the separate bulky suction instrument in and out of the surgical field. The result of the tips and retractor are measured against the traditional retractors and suction devices. The Hajarian Retractors/ Aspirator™ has new flat and thin profile tips that allows not only constant evacuation, eliminating in and out action of the traditional suction devices, but also eliminating the interruption in operation due to bloody or fluid filled surgical field(Fig. 2). In addition, they provide the same function as the corresponding retractor with integrated Hajarian surgical retractor/Aspirator™ (Fig. 4-5). The specially designed tip of these generations of suction tips prevents the tissue trauma due to suctioning the soft tissue and creating hematomas and petechia with traditional high vacuum dental suction tip (Fig. 3). The holes are position close enough to the tips for efficiency of evacuation at the bed of the surgical fields and they also allow uninterrupted evacuation even if some part of the tip is against tissues thus preventing suction of fluid and smoke due to. Due to the various holes in different positions, it guarantees suction in many directions, in all conditions and positions of the instrument (Fig. 3).

The Hajarian Surgical suction tips™ and Hajarian Retractor/Aspirator (patented, and other patents pending) have various forms that are designed for both dental, non-dental surgical fields. The unique tip design concept (patented) is common among the dental and non-dental (oral and maxillofacial, ENT, Plastic, General, Ob/Gyn, Orthopedic surgery) versions (Fig.

3). The dental field suction tips are disposable and come in two forms. The dental retractor/aspirator combinations assist in retracting the tongue and other mucosal soft tissue while provide unsurpassed suction ability due the multiport design of the tip (patented) assisting in dental surgical procedures. The option of mirror on the flat portion of the Hajarian suction tip™ (pano-Vac) is another advantage for dentist and can eliminate the need for dental mirror when preparing a tooth for dental restorations etc.

For general surgical procedures purposes, the Hajarian surgical Retractor/Aspirator™ devices are available in sterile disposable and stainless steel reusable options (Fig. 6) (patented and other patents pending). The comparison of the profile of the Hajarian Retractor/Aspirator™ and the traditional counterpart (Weider retractor, picture) shows the minimal increase in thickness maintaining the low profile property of the Hajarian Retractor/Aspirator™ (fig. 5). These suction tips have been tested and compared to the use of traditional separate retractors and suction. It is obvious that the surgical field is significantly less crowded with instruments and the field at the base is free of fluid blood or smoke from electrosurgical use. The cross section of the Hajarian Surgical suction tip™ (Fig. 4) shows the strategically placed multiport tip and the direction of flow of fluid or smoke into the suction line. The thin flat profile creates much more room for operation and manipulation with constant clear field from fluid and debris and smoke (Fig. 5). The connection to main suction line is also designed to accommodate varieties of dimensions tubes including the standard dental high vacuum line as well as standard disposable various surgical suction tubing used in hospitals and surgical centers. This unique ergonomic design of Hajarian Retractor/Aspirator™ can be custom made for any type of retractor used in surgery as needed.

Discussion

The new generation, Hajarian surgical Retractor/Aspirator™ has many advantages that is discussed and presented here. **First**, the notion of having fewer instruments in and out of the surgical field especially in deep and/or tight surgical field is always desirable by the operating surgeon. It goes without saying that the more visibility and room for maneuver the better quality of work and improvement in efficiency, time and cleanliness of the field from fluid, blood and smoke. The unique design of Hajarian surgical Retractor/Aspirator™ solves this issue by simply eliminating one bulky separate suction instrument in the field. The flat and ergonomic design of the suction component of the Hajarian Retractor/aspirator keeps the tissue retracted due to the wide flat tip and keeps the field dry due to the suction. **Second**, direct cylindrical suction tips such as Frazier family, although are useful for small area of surgery needed evacuation of fluid and blood, are not efficient in soft tissue large fields because they will aspirate the soft tissue in and preventing the intended suction action. This phenomenon also creates trauma to the tissue by creating hematoma or petechia. The Hajarian surgical Retractor/Aspirator™ has unique multiport patented design that allows suction if one portion of the multiport tip is blocked, thus guaranteeing uninterrupted suction. Besides, due to the

multiple small holes, the force of suction per single hole is significantly less than one whole large orifice of traditional suction tip such as Frazier series that virtually eliminated any hematoma formation from suctioning the tissue. Furthermore, the positions of the multiple hole and the two main suction ports assure that at any position, there are holes that are not blocked in any manner, thus having uninterrupted suction. **Third**, the purpose of the unique design of the recessed lip of the suction part of the retractor (patented) at the base of the Hajarian Retractor/Aspirator™ creates adequate distance between the suction ports and the base of the surgical field preventing suction of the soft tissue where the Hajarian Retractor/Aspirator™ is resting. Thus, any fluid at the base has a chance to be evacuated without interruption. **Forth**, obstruction of the suction in traditional one large whole suction instruments by debris and particulate materials are annoying and create interruption for cleaning and removing the obstruction manually. This problem is eliminated by the multiport design of the tip and the way the holes are situated that minimizes complete blockage allowing evacuation at sensitive moments during the operation.

In summary, Hajarian surgical Retractor/Aspirator™ has been tested and proved to be unique in evacuation in the surgical fields of fluids and debris without using additional instrument line. It combines a unique tip design for suction with the retractor capability that simply and significantly revolutionizes the concept of suction in surgical fields.



Fig. 1 Hajarian patented surgical Retractor/Aspirator™ for various surgical fields and procedures



Fig.2 - The actual prototype frontal view

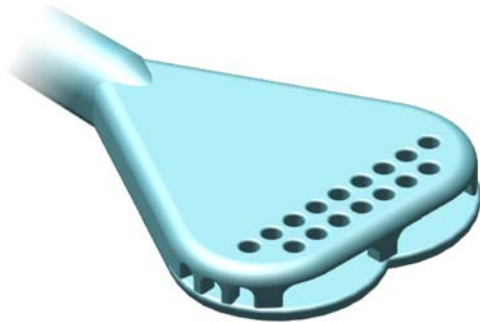


Fig. 3 - Hajarian surgical tip™ design allows panoramic suction with multiport strategically placed opening. The tip lip (A) prevents suction of the tissue into the larger port thus insuring constant suction at the base of the field without the need for moving the instrument. The ports at B and C position, insures uninterrupted suction at various angles and prevent flooding of the field.

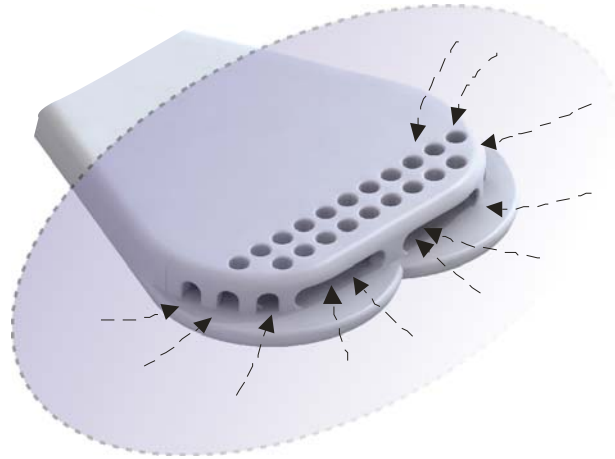


Fig.4 - Magnified tip with the lip design and multiport holes

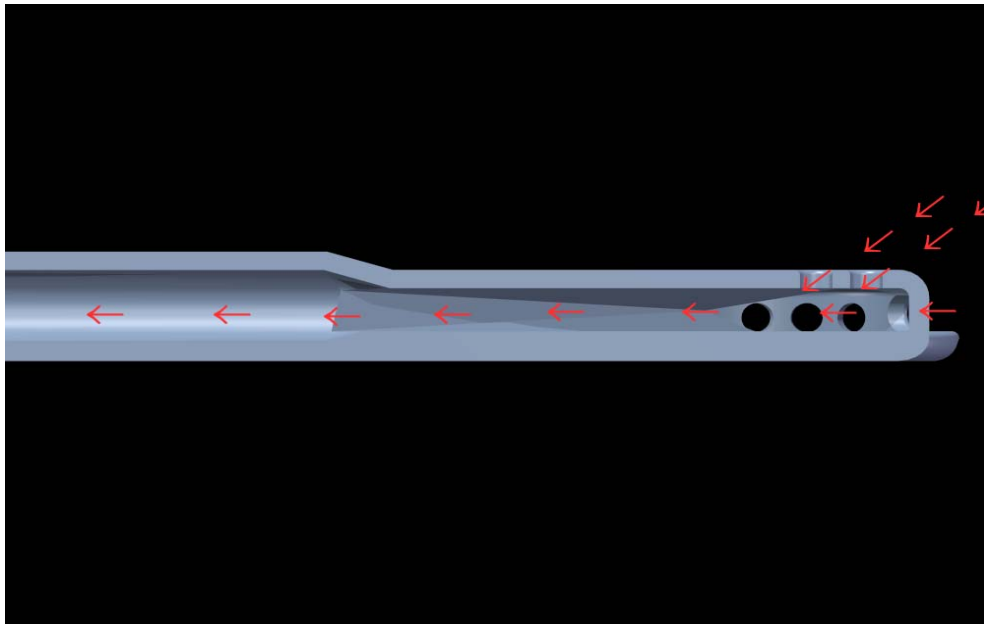


Fig 5- Cross section of the Hajarian surgical retractor/aspirator tip showing the multiple direction of entry of medium (fluid, surgical smoke and debris) into the main line.



Fig. 6 - The comparison of the shape and size of the Hajarian surgical Retractor/aspirator™ with traditional Weder retractor



Fig. 7 - The end on view of the Hajarian surgical suction/retractor with Weider Retractor Note the minimal increase in the thickness of the flat portion of the Hajarian suction/retractor compared to its counterpart

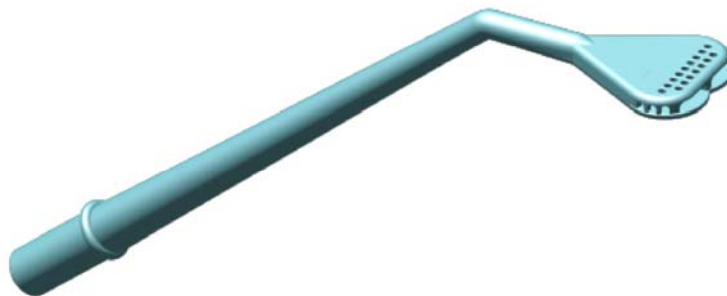


Fig. 8 - The disposable Hajarian surgical tip that is connected to the commercially available disposable surgical suction tip for dental or oral surgical procedures

References:

1. Weder, H, Sr. & Wolf, C.H.; Tongue Depressor, United state Patent Office, July 22, 1913