Does the Parker Flex-Tip endotracheal tube significantly contribute to First Pass Success? How? Why is that capability of critical importance?

How often have we witnessed or participated in a scenario where multiple attempts are made to intubate the trachea of a patient or an accident victim? Are we aware of the ominous consequences of such repeated attempts to intubate that patient?

Two clinical studies cry out for attention to these questions by all medical providers who intubate the human airway. In these studies, Dr. Tom Mort\(^1\) and Dr. John Sakles, et al\(^2\), have carefully documented the serious medical complications that multiply dramatically on the second and third intubation attempts, and each attempt thereafter. Their research has highlighted the importance of achieving intubation on the first attempt (Sakles) and no later than the second attempt (Mort), before a cascade of adverse events begins to threaten the patient’s life.

But even for anesthesiologists with decades of experience and great manual dexterity, first pass success (FPS) is by no means assured. Independent, unanticipated, intervening factors frequently thwart the success of even the most skilled and careful intubationist.

Among those factors are unseen and unpredictable, congenital and acquired, anatomical irregularities in the patient’s airway that prevent an endotracheal tube from being successfully maneuvered into the larynx and trachea. There is nothing we can do to change the patient’s airway to render it receptive to an advancing ET tube. Is there a more practical approach to enhancing the odds of achieving FPS?

Yes, another factor that may cause our intubations to fail is the equipment we are using – specifically, the endotracheal tube. During my career as an intensivist, I became convinced that the conventional, rigid, side-beveled distal tip of standard ET tubes has a tendency to get caught on and become impacted in airway structures. I investigated the history of those standard tubes, and found no alternative tip designs that were likely to prevent serious hang-ups on, and impactions in, the airway anatomy. Further, although conventional ET tube tips were designed over 130 years ago, I found no studies that had ever confirmed their safety.

In fact, clinical studies of short term intubations, carefully carried out by experienced physicians, have shown that airway injuries occurring during intubation are surprisingly common. Claims for airway trauma are frequent in the Closed Claims Project database of the American Society of Anesthesiologists, and severe outcomes, including brain


damage and death, are reportedly increasing. In the 1990’s, no effective action had been taken to identify the exact cause(s) or to stem the tide of these tragedies.

I was appalled by the lack of scientific attention to these grave medical mishaps and their legal repercussions. In 1998, I conducted cadaver studies to determine how the distal tip of conventional endotracheal tubes interacts with the airway anatomy during intubation. I discovered distinct mechanisms by which the tip geometry of standard ET tubes frequently and significantly traumatizes the airway by catching on and becoming impacted in normal and abnormal airway structures (e.g., turbinates, cords, arytenoids, soft tissues of the pharynx, polyps, tumors, etc.).

When such blind impingements and snags of the tube on the airway occur during intubations, the tube is typically withdrawn, repositioned, and then re-advanced, if the intubationist remains committed to making another intubation attempt. But simply trying again does not enhance the chance of success, because the same or other, blind hang-ups and impactions may recur on each subsequent attempt to advance the tube, due to its traumatic design features.

The mechanical injuries caused by repeated poking of the airway with standard endotracheal tubes range from minor lacerations to submucosal tunneling, avulsions, dislocations, and perforations. It does not require much force with standard tubes to catch on and disrupt the airway anatomy – and adjacent anatomical structures, such as the esophagus and pharynx, as well. Furthermore, repeated, unsuccessful intubation attempts can waste precious time and induce physiological complications on top of anatomical ones.

My cadaver studies had convinced me that if we wish to increase the odds of achieving fast, safe FPS, the tip geometry of standard ET tubes would have to be radically altered to enable those tubes to be advanced through the airway quickly, easily, and without hang-ups, impactions, or other causes of trauma and delay. Without the advent and use of such a revised tip, consistent, safe FPS would not be possible.

It was apparent that this revised, streamlined tip would have to prevent each of the specific mechanisms by which standard ET tubes catch on and traumatize the airway. It would have to work effectively in both oral and nasal intubations, and in conjunction with all varieties of ancillary devices, such as ordinary and video laryngoscopes, flexible fiberoptic scopes, bougies, tube exchange catheters, and light wands. It would also need to facilitate intubation of morbidly obese patients, and other difficult airways. Designing such a safe, versatile, multifunctional tip was a daunting challenge . . . . that I could not resist undertaking.

Relying on what I had learned from my cadaver studies about the mechanisms of injury caused by the tips of standard ET tubes, I designed a new ET tube tip geometry that would block each of those mechanisms. My goal was to enable smooth, First Pass Success by eliminating all harmful collisions, hang-ups, and impactions of ET tubes on the airway. The ability of this tip to quickly slide off of airway irregularities and into the trachea on the First Pass, without any snags, would also shorten the time required for intubation, thereby reducing the risk of hypoxemia, aspiration, and other complications related to the duration and number of intubation attempts.
The tube that I designed is called the Parker Flex-Tip endotracheal tube. One of its basic modes of action (flexing and sliding off of and past airway structures such as the cords and the nasal turbinates) can be seen in video clips on the Parker Medical website: www.parkermedical.com The gap-free mating of this tube tip with introducers, such as bougies and flexible fiberoptic scopes, dramatically facilitates the “railroading” of the Flex-Tip tube down the introducer and into the trachea, without gap-related hang-ups on the larynx.

My basic assumption in designing this new tube tip geometry has been that by enhancing the smooth, snag-free passage of the tube through the airway, the Flex-Tips would also significantly enhance the speed of intubation and the probability of success on the first attempt. Has this assumption proven correct?

The attached excerpts are from independent clinical studies and reports comparing the performance of Parker Flex-Tip tubes to standard endotracheal tubes. These studies contain evidence of significantly superior speed, ease-of-use, and safety of the Flex-Tip tubes in various applications, and a much greater incidence of First Pass Success, where such data was tracked. I am not aware of such unique results with any other endotracheal tubes. The medical benefits of this new technology should be obvious.

Jeffrey D. Parker, M.D., J.D.
President
Parker Medical
2121 Herrick Ave.
Cincinnati, OH 45208
Office 513-321-1097
Cell 513-720-1137
www.parkermedical.com
pigman1@earthlink.net