Endotracheal tube fixation: Still a dilemma

Endotracheal tube (ETT) displacement can become a catastrophic event in surgeries where in anesthesiologists are away from the surgical field, and where easy access to the ETT is difficult. Hence, the fixation of endotracheal tube by securing adhesive tapes is of utmost importance as it not only provides effective ventilation but also minimizes complications due to re-interventions.[1,2] The desired qualities of these tapes are good quality adhesive material, water-resistant nature, non-toxic, non-irritant, non-allergic material, easy availability and being economical.

We compared the adhesiveness of 6 different adhesive tapes used in our institute ex-vitro, after wetting them with antiseptic solution.

TAPE 1: Cloth-based woven non-elastic adhesive tape [Porouspore, Sterimed Healthcare Technologies LLC, Florida]
TAPE 2: Silk-based adhesive tape [Durapore, 3M]
TAPE 3: Silicone gel-based water resistant adhesive tape [STERIPORE, Sterimed Healthcare Technologies LLC, Florida, USA]
TAPE 4: Micro-porous non-woven acrylic fabric adhesive tape [Surgi-pore, surgical tape]
TAPE 5: Cloth-based woven elastic adhesive tape [Sterimed Elastic Adhesive Bandage BP]
TAPE 6: Cloth-based woven elastic adhesive tape covered with transparent IV film dressing [Sterimed Elastic Adhesive Bandage BP + Tegaderm, 3M India Ltd].

All six tapes of similar dimensions were adhered to a particle board. Figure 1(a) and then were draped wet using equal quantity of Povidone Iodine antiseptic solution [Microshield PVP-S, Alliance Formulations, India]. Figure 1(b) routinely used for sterile draping of surgical site. We compared adhesiveness, ease of removal and ability of reapplication after an interval of 4 hours Figure 1(c).

We observed that ease of removal was: 1> 5> 2> 3> 4> 6. Figure 1(d). Cloth-based non-elastic adhesive tape [TAPE 1] came off on its own within 30 minutes of wetting and lost most of its adhesiveness. Cloth-based woven elastic adhesive tape [Tape 5] came off easily after applying minimal force but retained adhesiveness to be reapplied. However, Tape 5 with Tegaderm covering [Tape 6] remained relatively dry due to the water resistant nature of Tegaderm, and hence did not peel off even after 4 hours of wetting with antiseptic solution. Tapes 2, 3 and 4 were relatively better adhered to the surface and difficult to remove.

Adhesiveness after reapplication of the same tapes was best seen with Tape 3 followed by Tapes 6, 4 and 2 respectively. We also compared the cost per patient of each tape to know their cost effectiveness. Cost per person for 2 strips of 1.25 cm × 15 cm dimensions were Rs 0.36, 0.72, 23.667, 0.094, 0.45 and 17.456, for tapes from 1-6, respectively. Thus, tape 4 was the cheapest of the lot and Tape 3 the costliest [Table 1]. Their cost benefit ratio for the hospital is yet to be determined.

Cloth-based woven elastic adhesive tape covered with transparent IV film dressing and micro-porous non-woven acrylic fabric adhesive tape are the reasonably good options for tube fixation. The above observations are based upon the adhesiveness to an ex-vitro surface.

However, the major limitation of this observation is that the ex-vitro surface cannot match the structural properties of the human skin surface completely.

We cannot comment on the clinical superiority of one tape over the other without any randomized controlled trial. Thus, there

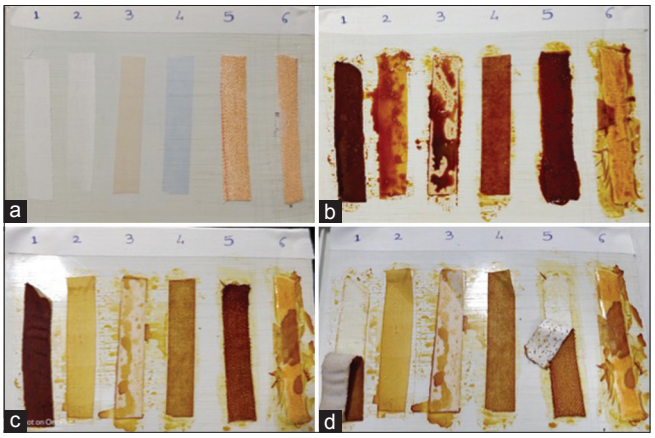

Figure 1: (a) Tape 1-6 fixed to a particle board; (b) Tapes 10 minutes after wetting with antiseptic solution; (c) Tapes seen 4 hours after wetting with antiseptic solution; (d) Tapes seen after applying force for removal

Table 1: Comparative cost analysis of different tapes

TAPE	Cost per person*,++
TAPE 1: POROUSPORE	0.36 rupees
TAPE 2: DURAPORE	0.72 rupees
TAPE 3: STERIPORE	23.667 rupees
TAPE 4: SURGIPORE	0.094 rupees
TAPE 5: DYNAPLAST	0.45 rupees
TAPE 6: DYNAPLAST + TEGADERM	17.456 rupees

**Cost per person=2 strips of 1.25 cm × 15 cm dimension. ++Cost as per our hospital store prices*

is a large void in available literature regarding endotracheal tube fixation with adhesive tapes, and this study hence provides a scope for further randomized controlled trials.

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Conflicts of interest
There are no conflicts of interest.

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