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Comparative Analysis of Supraglottic Airway Devices in Hospital and Pre-Hospital Settings: A Narrative Review

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Difficult Airway

Abstract

Introduction: A supraglottic airway device (SAD) is an airway device that is inserted into the upper airway or pharynx to allow for oxygenation, ventilation, and administering anesthesia. Among the numerous SADs available, the Laryngeal Mask Airways (LMA), I-Gel, and Air-Q are among the most widely used in both hospital and pre-hospital settings**.** This narrative review compares the efficacy, safety, and usability of LMA, i-Gel, and Air-Q in hospital vs. pre-hospital environments by analyzing complication rates, insertion-success rates, and other operational characteristics.

Methods: This narrative review followed a structured search strategy using PubMed and Google Scholar with predefined keywords including "supraglottic airway devices," "LMA," "i-gel," "Air-Q," and "airway device efficacy." Sources were limited to English-language articles indexed on PubMed. Articles reviewing the LMA, i-gel, and Air-Q were published between 2008 and 2024.

Results: The results demonstrate distinct advantages for each device corresponding to specific clinical scenarios. The LMA remains versatile and reliable for general use. The i-gel offers lower complication rates, including a postoperative sore throat (POST) rate of approximately 5–8%, compared to 10–15% for the LMA and 12–15% for the Air-Q. The Air-Q excels as an intubation conduit, making it ideal for difficult airways requiring endotracheal tube (ETT) passage. Postoperative sore throat was the most common adverse event across all three devices.

Conclusion: The LMA, i-gel, and Air-Q are all effective SADs with unique attributes. Device selection should be guided by clinical objectives, patient population, safety priorities, and practitioner experience. Further research, particularly in pediatric and high-risk populations, is warranted to refine their applications.

Introduction

Airway management is one of the most critical responsibilities of anesthesiologists and emergency medicine (EM) physicians. Efficiently establishing a secure airway is essential for optimizing patient outcomes[1]. While endotracheal intubation (ETI) remains the gold standard for definitive airway management, supraglottic airway devices (SADs) represent safe and effective alternatives in select clinical contexts. SADs are most commonly used in short and minor surgical procedures, as rescue devices following failed ETI, and in emergency and pre-hospital settings when a difficult airway is encountered[2]. SADs offer advantages over ETI including reduced invasiveness, ease of use, fewer postoperative complications, and more rapid placement[3].

Among the numerous SADs commercially available, the Laryngeal Mask Airway (LMA), i-gel, and Air-Q are the most widely used in both hospital and pre-hospital environments[4]. Despite their widespread use, limited literature directly compares all three devices with respect to patient outcomes, usability, insertion success rates, and complication profiles. This review aims to address that gap by evaluating the operational characteristics, limitations, and mechanical features of each device, with particular attention to their respective roles in operative anesthesia versus emergency medicine contexts.

Physiology and Device Mechanics

SADs are airway devices inserted into the upper airway or pharynx to facilitate oxygenation, ventilation, and anesthesia delivery. They are positioned above the glottis—in contrast to ETI, which places a tube directly into the trachea—and are sometimes referred to as supraglottic airways (SGAs)[5]. SADs have substantially reduced the need for ETI during short surgical procedures and emergency airway resuscitation.

SADs maintain airway patency by forming a seal around the laryngeal entrance, permitting positive pressure ventilation. However, because no SAD completely eliminates air entry into the esophagus, gastric insufflation remains a shared limitation. SAD-induced gastric insufflation results from a positive feedback mechanism: elevated airway pressure promotes esophageal sphincter relaxation, increasing esophageal dilation and air entry, which can ultimately lead to gastric regurgitation and aspiration pneumonia[6,7,8]. The degree of gastric insufflation is influenced by appropriate device sizing and device type. Second-generation SADs have addressed this concern through the integration of esophageal drainage channels, which direct gastric contents away from the trachea[9,10].

ETI remains the gold standard for establishing a definitive airway but carries notable disadvantages compared to SADs. ETI requires more extensive training and, in the pre-hospital setting, can only be performed by advanced emergency medical technicians (EMTs) or paramedics[11]. By contrast, SADs can be inserted by any EMT-level provider. Additionally, postoperative complications such as sore throat and cough are less frequent following SAD use compared to ETI[12].

Methods

This narrative review followed a structured literature search strategy using PubMed and Google Scholar. Search terms included: "supraglottic airway devices," "LMA," "i-gel," "Air-Q," "airway complications," "SAD generation," "endotracheal intubation," "airway device efficacy," and "airway device safety." Sources were limited to English-language articles indexed on PubMed. Articles reviewing the LMA, i-gel, and Air-Q were published between 2008 and 2024 to reflect contemporary clinical practice.

Inclusion criteria encompassed studies pertaining to the effectiveness and mechanism of each airway device in emergency medicine, pre-hospital, and operative contexts. All patient populations were considered for inclusion, although pediatric data were limited. Study designs included randomized controlled trials (RCTs), systematic reviews, meta-analyses, case reports, and textbook chapters. Manuscripts not indexed on PubMed or Google Scholar were excluded, as were non-English-language publications.

Approximately 200 articles were screened by multiple reviewers; 34 met the inclusion criteria and were ultimately included in this review. A PICO framework guided evidence selection: Population (patients requiring airway management), Intervention (LMA, i-gel, or Air-Q), Comparison (between devices, and versus ETI), and Outcome (insertion success rate, sealing pressure, complication rates, usability). A clear research gap exists in this field, particularly for pediatric and high-risk populations, further justifying the narrative approach.

Results

Laryngeal Mask Airway (LMA)

The LMA is one of the earliest SADs and remains routinely used in both operative and emergent settings. It was first introduced in the 1980s as a prototype by Dr. Archie Brain and has since been the predominant SAD in the operating room for short procedures under general anesthesia[13]. Initial applications were in dental surgery, where the LMA's inflatable cuff provided protection from blood and debris. Its use subsequently expanded to head, neck, and ear, nose, and throat surgeries, and ultimately to emergency departments, intensive care units, and military field settings.

The LMA features an inflatable cuff designed to seal the laryngeal inlet, ensuring effective ventilation. The device provides a primary ventilation seal capable of delivering pressures up to 32 cm H_2O, and second-generation models incorporate a drain tube that lies over the esophagus, maintaining independent ventilation and providing an alert for potential regurgitation, thereby reducing the risk of aspiration[9].

The LMA Supreme™ is a second-generation single-use device that incorporates esophageal venting, reducing postoperative nausea and vomiting by approximately 40% compared to ETI[14] (Figure 1). The LMA ProSeal™, another second-generation reusable device, demonstrates a high first-attempt success rate, versatility across elective and emergency cases, and a well-documented safety profile[15] (Figure 2). The ProSeal is especially well-studied in pediatric populations, demonstrating higher placement success rates and greater oropharyngeal leak pressures

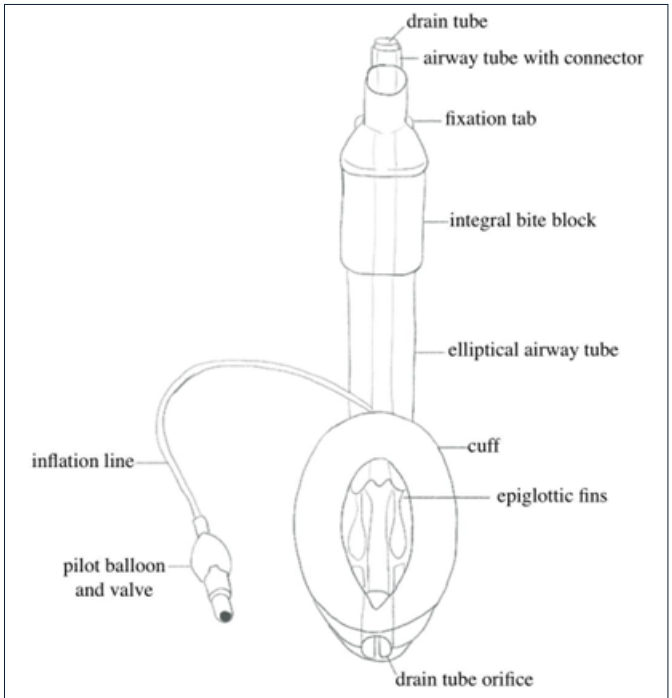

Figure 1: LMA Supreme with parts labeled

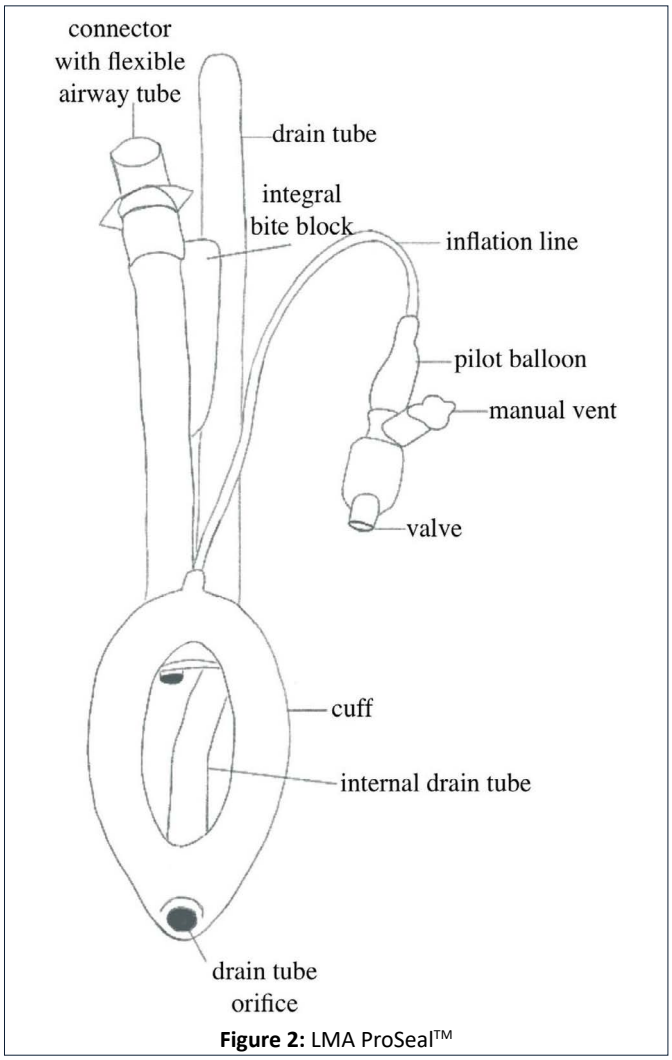

Figure 2: LMA ProSeal™

than the classic LMA (c-LMA), indicating a superior airway seal[1,16]. It also includes an integrated bite block to maintain optimal positioning.

i-gel

The i-gel is a second-generation SAD, launched in 2007, that features a non-inflatable cuff composed of a thermoplastic elastomer that conforms to the individual laryngeal anatomy, creating an effective perilaryngeal seal without requiring cuff inflation[7]. The material exploits thermoplastic properties, softening in response to the patient's body temperature and salivary warmth to mold to the specific laryngeal contours[18,19]. Multiple size options are available (sizes 1 through 5), allowing appropriate sizing across patient populations. This design simplifies insertion, reduces time-to-airway establishment, and increases first-attempt success rates[18,19]. The i-gel is depicted in Figure 3.

The i-gel carries a lower risk of pharyngeal trauma compared to inflatable-cuff devices, likely attributable to the softer gel consistency[20]. Despite the absence of an inflatable cuff, it achieves sealing pressures competitive with those of the LMA (mean 29 ± 0.5 cm H_2O vs. 25 ± 0.5 cm H_2O for the LMA; see Table 1)[7,21]. Postoperative sore throat occurs in approximately 5–8% of i-gel cases, representing the lowest rate among the three devices reviewed[20].

A notable limitation of the i-gel is a relatively higher rate of gastric regurgitation compared to other SADs, which makes it less suitable for prolonged ventilation[22,23]. Evidence regarding its use in pediatric populations is limited; some studies suggest it may be inferior to the LMA-ProSeal™ in pediatric airways, likely due to the ProSeal's superior

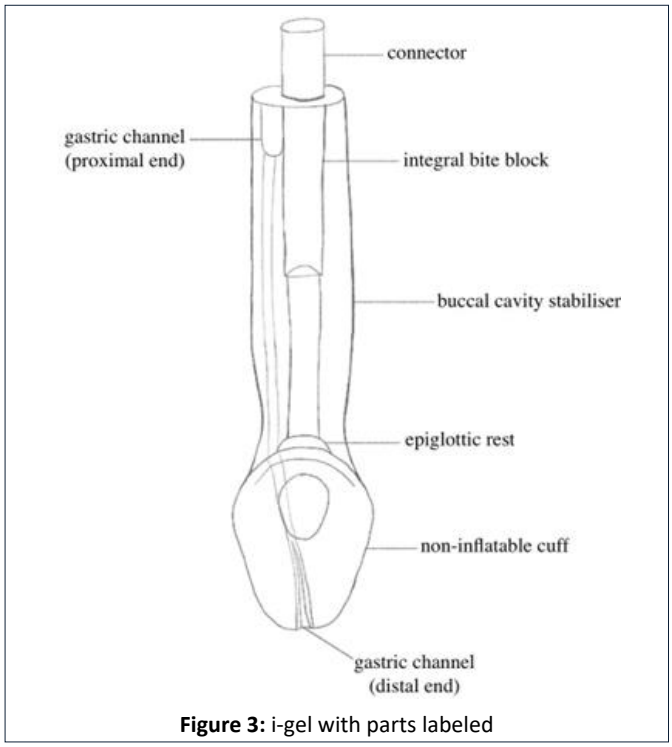

Figure 3: i-gel with parts labeled

sealing characteristics in smaller anatomies, although the i-gel can still be used safely in this population[17,24].

Air-Q

The Air-Q Intubating Laryngeal Airway (ILA) was introduced by Daniel Cook in 2005. It features an anteriorly curved shaft and an inflatable cuff that molds to perilaryngeal structures, providing adequate seal pressure while also serving as a conduit for ETT passage into the trachea (Figure 4)[25,26]. An ETT may be passed blindly through the ILA and directed into the trachea via an anteriorly positioned elevation ramp, or facilitated with fiberoptic guidance[27]. The Air-Q is available in pediatric sizes (1 and 1.5), allowing intubation of small children[28].

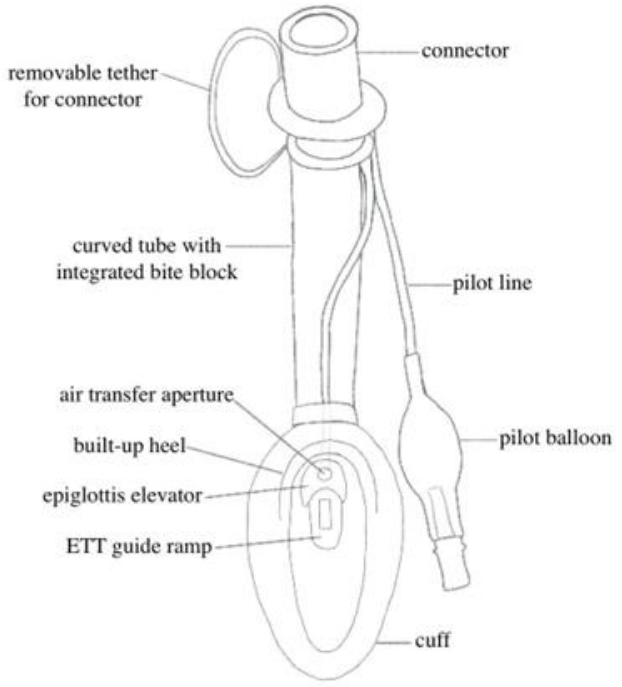

Figure 4: Air-Q with parts labeled

The Air-Q's dual functionality—as both an SAD and an intubation conduit—comes at the cost of a somewhat lower first-attempt insertion success rate (91.5 ± 1.25%) compared to the LMA and i-gel, though evidence is mixed: one study demonstrated faster insertion times than the c-LMA[29,30]. The Air-Q also incorporates a self-pressurizing dynamic cuff that equilibrates to the patient's airway pressure, maintaining an optimal seal throughout all phases of ventilation[30]. Aspiration risk is present but mitigated by a port that accommodates a nasogastric tube for gastric decompression[27].

Comparative Analysis: Hospital versus Pre-Hospital Settings

The optimal SAD differs depending on the clinical context. Operative anesthesia settings place greater priority on aspiration protection and controlled ventilation, whereas emergency and pre-hospital settings prioritize rapid insertion, ease of use, and first-attempt success by providers with variable training levels.

In the operative anesthesia context, second-generation LMAs—particularly the LMA ProSeal™—are generally preferred, given their robust aspiration-protective features and high sealing pressures under controlled conditions[31]. The i-gel is gaining traction in emergency and pre-hospital settings due to its superior ease of insertion and flexible anatomical fit. A study conducted among Armed Forces paramedics found that both the first-attempt success rate and perceived ease of insertion were higher with the i-gel than with the c-LMA[32]. Notably, although video laryngoscopy (e.g., GlideScope®) has reduced the frequency of SAD use in emergency departments, the i-gel has demonstrated

Table 1: Comparison of SAD Utilization Features and Variables

Feature	LMA (Classic)	LMA ProSeal™	i-gel	Air-Q
First-Attempt Success Rate	95% ± 1.5%	96–98%	96% ± 0.5%	91.5% ± 1.25%†
Mean Sealing Pressure	25 ± 0.5 cm H_2O	29–32 cm H_2O	29 ± 0.5 cm H_2O	24 ± 0.5 cm H_2O
Cuff Type	Inflatable	Inflatable + drain tube	Non-inflatable thermoplastic elastomer	Self-pressurizing inflatable
POST Rate	10–15%	~8–10%	~5–8% (lowest)	~12–15%
ETT Passage	No	No	No	Yes (primary advantage)
Gastric Drainage Port	No (c-LMA)	Yes	Yes (gastric channel)	Yes (NG tube compatible)
Pediatric Use	Yes	Preferred (best evidence)	Yes (limited evidence; may be inferior to ProSeal)	Yes (sizes 1–1.5 for small children)
Reusability	Reusable (c-LMA)	Reusable	Single use	Single use
Preferred Setting	Operative (general use)	Operative / Pediatric	Emergency / Pre-hospital / CPR	Difficult airway / ETT conduit
Key Advantages	Versatile, well-studied, widely available	Superior seal; aspiration protection; bite block	Ease of insertion; low POST; no cuff inflation needed	Allows blind or fiberoptic ETT passage; self-pressurizing cuff
Key Limitations	Higher POST than i-gel; requires cuff inflation	More complex insertion than c-LMA	Higher gastric regurgitation; limited pediatric data	Lower insertion success; requires more training

superiority over ETT in minimizing interruptions during cardiopulmonary resuscitation (CPR)—a clinically important consideration given the association between CPR interruptions and reduced survival[33,34].

The Air-Q is suited to either setting and uniquely allows relatively straightforward conversion to ETT. It is gaining traction as a pediatric intubation conduit, though the LMA-ProSeal™ remains the established reference standard for pediatric airway management.

The body of evidence supporting these comparisons varies in quality. Most data derive from single-center RCTs with heterogeneous patient populations, operator experience levels, and outcome definitions, limiting direct comparison. Several studies also do not differentiate between adult and pediatric subgroups, or between elective and emergent use, introducing potential confounding. Complication rates such as POST are subject to assessment variability across studies. These limitations should be considered when interpreting the comparative data summarized in Table 1.

Conclusion

This narrative review demonstrates that the LMA, i-gel, and Air-Q each occupy a distinct clinical niche within airway management. Device selection should be guided by clinical context, patient population, practitioner training, and specific safety priorities rather than by a single universal recommendation.

In operative anesthesia, second-generation LMAs—particularly the LMA ProSeal™—are supported by robust evidence and remain the preferred choice, especially in pediatric populations where sealing efficacy is paramount. In emergency and pre-hospital settings, the i-gel's superior ease of insertion, favorable complication profile (including the lowest POST rates), and efficacy during CPR make it the preferred SAD for providers across experience levels. The Air-Q is best reserved for situations requiring ETT conversion, particularly in anticipated difficult airways, and its pediatric sizing options make it a useful intubation conduit in smaller patients.

The current evidence base is limited by heterogeneity in study design, patient populations, and outcome reporting. Most comparative studies are single-center RCTs with limited generalizability, and data for pediatric and high-risk populations remain sparse. Future research should prioritize large, multicenter, prospective trials comparing these devices across age groups, clinical settings, and operator experience levels, using standardized outcome definitions. Such studies are essential to generate evidence-based recommendations that can guide clinical practice with greater confidence.

Disclosure

All figures were recreated based on product information and physical inspection by co-author Megan Elizabeth DeKok. Figures are original works of the authors. No funding was received for this research. The authors declare no conflicts of interest.

References

1. Ramesh S, Jayanthi R. Supraglottic airway devices in children. Indian J Anaesth. 2011; 55(5): 476-82. doi:10.4103/0019-5049.89874
2. Henderson JJ, et al. Difficult Airway Society guidelines for management of the unanticipated difficult intubation. Anaesthesia. 2004; 59(7): 675-694. doi:10.1111/j.1365-2044.2004.03831.x
3. Zhang K, Zhou M, Zou Z, et al. Supraglottic airway devices: a powerful strategy in airway management. Am J Cancer Res. 2024; 14(1): 16-32. doi:10.62347/KJRU4855
4. Lai CJ, Yeh YC, Tu YK, et al. Comparison of the efficacy of supraglottic airway devices in low-risk adult patients: a network meta-analysis and systematic review. Sci Rep. 2021; 11: 15074. doi:10.1038/s41598-021-94114-7
5. White MC, Cook TM, Stoddart PA. A critique of elective pediatric supraglottic airway devices. Paediatr Anaesth. 2009; 19(Suppl 1): 55-65. doi:10.1111/j.1460-9592.2009.02997.x
6. Asai T. Who is at increased risk of pulmonary aspiration? Br J Anaesth. 2004; 93(4): 497-500.
7. Van Zundert AAJ, Kumar CM, Van Zundert TCRV, et al. The case for a 3rd generation supraglottic airway device facilitating direct vision placement. J Clin Monit Comput. 2021; 35: 217-224. doi:10.1007/s10877-020-00537-4
8. Kim JH, et al. Complications of sedation with sedative hypnotics and endotracheal intubation. Anesth Pain Med. 2020; 15(2): e1239.
9. LMA ProSeal®: A Comprehensive Overview. LMA Company; 2014.
10. Beringer RM, Kelly F, Cook TM, et al. A cohort evaluation of the paediatric i-gel™ airway during anaesthesia in 120 children. Anaesthesia. 2011; 66: 1121-1126. doi:10.1111/j.1365-2044.2011.06884.x
11. Ruetzler K, Roessler B, Potura L, et al. Performance and skill retention of intubation by paramedics using seven different airway devices—a manikin study. Resuscitation. 2011; 82(5): 593-7. doi:10.1016/j.resuscitation.2011.01.008
12. Ahn JH, Jeong J, Kang SH, et al. Comparison of intragastric pressure between endotracheal tube and supraglottic airway devices in laparoscopic hepatectomy. Medicine. 2021; 100(24): e26287.
13. Van Zundert TCRV, Brimacombe JR, Ferson DZ, et al. Archie Brain: celebrating 30 years of development in laryngeal mask airways. Anaesthesia. 2012; 67: 1375-1385. doi:10.1111/anae.12003.
14. LMA® ProSeal™ Airway. LMA Company. Available at: https://www.lmaco.com/products/lma-proseal-airway.
15. Martín-Pereira J, et al. Laryngeal tubes and laryngeal mask devices for supraglottic airway management in out-of-hospital emergency care: a systematic review. Emergencias. 2019; 31(6): 417-428.
16. Nørskov AK, Rosenstock CV, Leahy J, et al. Closing in on the best supraglottic airway for paediatric anaesthesia? Anaesthesia. 2017; 72: 1167-1170. doi:10.1111/anae.13985
17. Oba S, Turk HS, Isil CT, et al. Comparison of the Supreme™ and ProSeal™ laryngeal mask airways in infants: a prospective randomised clinical study. BMC Anesthesiol. 2017; 17: 125. doi:10.1186/s12871-017-0418-z

18. Dingley J, Stephenson J, Allender V, et al. Changes in hardness and resilience of i-gel™ cuffs with temperature: a benchtop study. Anaesthesia. 2018; 73: 856-862. doi:10.1111/anae.14300.

19. Reddy AM, Varghese N, Herekar B, et al. Does prewarming of i-gel improve insertion and ventilation in anaesthetised and paralysed patients? Saudi J Anaesth. 2019; 13(3): 215-221. doi:10.4103/sja.SJA_110_19

20. Damodaran S, Sethi S, Malhotra SK, et al. Comparison of oropharyngeal leak pressure of Air-Q™, i-gel™, and LMA Supreme™ in adult patients during general anesthesia. Saudi J Anaesth. 2017; 11(4): 390-395. doi:10.4103/sja.SJA_149_17

21. Jadhav PA, Dalvi NP, Tendolkar BA. i-gel versus laryngeal mask airway-ProSeal: comparison of two supraglottic airway devices in short surgical procedures. J Anaesthesiol Clin Pharmacol. 2015; 31(2): 221-5. doi:10.4103/0970-9185.155153

22. Park JH, Kim JY, Park K, et al. A randomized comparison of volume- and pressure-controlled ventilation in children with the i-gel. Medicine. 2017; 96(18): e6772. doi:10.1097/MD.0000000000006772

23. Braz LG, Braz DG, Cruz DS, et al. Mortality in anesthesia: a systematic review. Clinics (Sao Paulo). 2009; 64: 999-1006.

24. Saran S, Mishra SK, Badhe AS, et al. Comparison of i-gel supraglottic airway and LMA-ProSeal™ in pediatric patients under controlled ventilation. J Anaesthesiol Clin Pharmacol. 2014; 30(2): 195-8. doi:10.4103/0970-9185.130013.

25. Abbas D, Abdghaffar E. Comparison of the Air-Q intubating laryngeal airway versus the modified Williams intubating airway as aids for fiberoptic tracheal intubation training. Ain-Shams J Anaesthesiol. 2013; 6(2): 134.

26. Gordon J, Cooper RM, Parotto M. Supraglottic airway devices: indications, contraindications and management. Minerva Anestesiol. 2018; 84(3): 389-397. doi:10.23736/S0375-9393.17.12112-7

27. Attarde VB, Kotekar N, Shetty SM. Air-Q intubating laryngeal airway: a study of the second generation supraglottic airway device. Indian J Anaesth. 2016; 60(5): 343-8. doi:10.4103/0019-5049.181596.

28. Goyal R. Small is the new big: an overview of newer supraglottic airways for children. J Anaesthesiol Clin Pharmacol. 2015; 31(4): 440-449. doi:10.4103/0970-9185.169048

29. Girish K, Muthiah T, Baidya DK, et al. Comparison of tracheal intubation using the Air-Q ILA and LMA Blockbuster among adults undergoing elective surgery. Turk J Anaesthesiol Reanim. 2024; 52(4): 147-153. doi:10.4274/TJAR.2024.241624

30. Ha SH, Kim MS, Suh J, et al. Self-pressurized Air-Q® intubating laryngeal airway versus the LMA® Classic™: a randomized clinical trial. Can J Anaesth. 2018; 65(5): 543-550. doi:10.1007/s12630-018-1082-6

31. Chang JE, Kim H, Lee JM, et al. A prospective, randomized comparison of the LMA-Protector™ and i-gel™ in paralyzed, anesthetized patients. BMC Anesthesiol. 2019; 19: 118. doi:10.1186/s12871-019-0785-8

32. Verma RN, Sethi N, Honwad MS, et al. Evaluation of four supraglottic devices used by paramedical staff for securing airway in simulated emergency airway management. Med J Armed Forces India. 2021; 77(1): 86-91. doi:10.1016/j.mjafi.2020.02.002

33. GlideScope. Atrium Health Carolinas Simulation Center. Available at: https://atriumhealth.org/education/carolinas-simulation-center/simulation-equipment/glidescope

34. The Efficacy of the i-Gel Supraglottic Airway in Cardiac Arrest Patients. Resuscitation Group. Available at: https://www.resuscitationgroup.com/blog/29/the-efficacy-of-the-igel-supraglottic-airway-in-cardiac-arrest-patients