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Emergency Airway Management of Neonatal Cystic Hygroma: A Systematic Review and Meta-Analysis.

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ABSTRACT

Background: Cystic hygroma is a benign congenital lymphatic malformation predominantly occurring in the cervicofacial region, frequently presenting life-threatening airway emergencies in neonates and infants. Emergency Airway Management of Neonatal, strategy advocates simplified, minimally invasive interventions over complex procedures in emergency settings. Objective: This study aimed to evaluate the efficacy and safety of the KISS strategy, specifically needle aspiration and simplified airway management techniques, in the emergency management of neonatal cystic hygroma with respiratory distress, through a systematic review and meta-analysis of published literature. Methods: A comprehensive literature search was conducted across PubMed, Scopus, Google Scholar, and Cochrane Library databases for studies published between 2000 and 2025. A total of 18 studies comprising 142 patients were included. Results: The pooled success rate for simplified interventions was 82.4% (95% CI: 75.8–87.9%). Needle aspiration achieved a success rate of 85.7%. The KISS approach significantly reduced the need for emergency tracheostomy (17.6% vs. 42.3%, $p < 0.001$) and was associated with fewer complications. The in-hospital mortality rate was 4.9%. Conclusion: The KISS strategy represents an effective, safe, and reproducible approach for managing life-threatening airway emergencies in neonatal cystic hygroma, particularly in resource-limited settings.

Key Words: *Cystic hygroma; KISS strategy; Emergency airway management; Needle aspiration; Neonatal; Difficult airway; Meta-analysis; Lymphatic malformation*

INTRODUCTION

Cystic hygroma, also termed macrocystic lymphatic malformation, is a congenital benign tumour composed of large lymph-containing cysts that arises from failure of the lymphatic system to establish appropriate venous drainage connections during embryonic development [1]. These malformations account for approximately 5–10% of all benign tumours in infancy, with an estimated incidence ranging from 1:6,000 to 1:16,000 live births, and demonstrate a marked predilection for the head and neck region, where 70–80% of all cases are located, particularly in the posterior cervical triangle [2,3]. Cervicofacial cystic hygromas pose a critical clinical challenge because of their propensity to cause airway obstruction, either through direct extrinsic compression of the trachea and larynx or through intrinsic extension into the oropharynx, base of the tongue, and mediastinum [4,5]. In neonates and young infants, the anatomical peculiarities of the paediatric airway, including a relatively large tongue, cephalad larynx, and narrow subglottic space, further exacerbate the risk of complete airway occlusion, making emergency airway management exceptionally challenging [6,7]. The clinical presentation may range from an incidental prenatal finding on ultrasonography to acute respiratory distress with cyanosis and stridor at birth, necessitating immediate intervention [8,9]. While prenatal diagnosis using ultrasound has improved the ability to plan delivery and postnatal airway.

management, a significant proportion of cases still present without prior antenatal detection, thereby necessitating emergent decision-making under resource-constrained conditions [10,11]. The conventional treatment modalities for cystic hygroma include complete surgical excision, sclerotherapy using agents such as bleomycin or OK-432, and serial aspiration, each associated with variable success rates and complication profiles [12,13]. However, in the acute emergency setting where respiratory failure is imminent and advanced equipment such as fiberoptic bronchoscopes (FOB) or supraglottic airway devices (SGAD) may not be available, the clinician is compelled to resort to simpler and more immediately accessible techniques [14,15]. The Keep It Simple and Safe (KISS) strategy, originally a design principle attributed to the aeronautics engineer Kelly Johnson, has found meaningful application in clinical medicine, advocating that the simplest intervention with the highest probability of immediate success should be preferred in emergency scenarios [16,17]. In the context of neonatal cystic hygroma with acute airway compromise, the KISS strategy translates into the use of needle aspiration to decompress the cystic mass, thereby reducing its volume and facilitating subsequent orotracheal intubation without the need for emergency tracheostomy or advanced airway adjuncts [18]. However, there remains a paucity of high-level evidence supporting this simplified approach, as most published reports are limited to individual case reports and small case series, with no meta-analytical synthesis evaluating the pooled efficacy of the KISS strategy across multiple emergency settings. The objective of this study was therefore to conduct a systematic review and meta-analysis of published literature to evaluate the pooled success rate, complication rate, and mortality associated with simplified emergency airway management techniques in cystic hygroma cases, with the hypothesis that the KISS strategy achieves comparable or superior outcomes to complex interventions while requiring fewer resources and shorter procedural times.

MATERIAL AND METHODS

Material

This systematic review and meta-analysis was conducted at the Department of Anaesthesia, SRVS Medical College and Hospital, Shivpuri, Madhya Pradesh, India. The material comprised clinical data extracted from published studies reporting emergency airway management in patients with cervicofacial cystic hygroma using simplified intervention techniques consistent with the KISS (Keep It Simple and Safe) strategy. The cases included in this meta-analysis presented with a broad clinical spectrum. Among the representative cases, one study reported a 6-day-old female neonate with huge cystic hygroma who was emergently transferred from the ward to the operating room (OR) with cyanosis, respiratory obstruction, and drowsiness [18]. On examination, her heart rate was 140/min, respiratory rate 40/min, and SpO_2 was 74% on air. No other investigations were available. Oropharyngeal suctioning was performed, and O_2 supplementation improved her skin colour, and SpO_2 rose to 93%. Awake oral laryngoscopy was performed, but the epiglottis was not visible due to huge cystic swelling. As FOB or SGAD were not available, a decision was made to aspirate fluid from the swelling using an 18G needle to reduce its size and facilitate intubation (Figure 9). Once the swelling was reduced, intubation with 2.5 mm ETT was possible after O_2 and sevoflurane induction. This improved her oxygenation and stabilized all vital signs. Surgery was deferred until blood products were arranged. Extubation was performed once extubation criteria were met [18]. Another representative study described a neonate with a large cystic hygroma (17×6 cm) in suprahyoid location, with no coordinated prenatal care, presenting with obstruction and hypoxia requiring intubation, complicated by multiple self-extubations (Figure 1) [5]. The first intubation attempt by direct laryngoscopy with video laryngoscope failed; the second attempt using easy LMA ventilation followed by successful fiberoptic intubation through LMA was successful. Tracheostomy was subsequently performed with preoperative positioning (extended neck, elevated and secured lesion with taping), uncomplicated placement of flextend cuffed neonatal 3.0 Bivona tracheostomy tube in mildly deviated trachea, monitored for engorged draining veins, and postoperative protection with mepilex surrounding on skin to prevent anticipated pressure ulcer formation (Figure 3, Figure 7) [5,7]. Additional representative cases included a 2-year-old, 10 kg child with a painful and progressively increasing cystic mass (4×2 cm) on the left side of neck extending beyond the midline (Figure 6), diagnosed as cystic hygroma with planned surgical excision after no response to intralesional bleomycin [7,10]. On examination, the patient had mild respiratory distress; anteroposterior (AP) and lateral X-ray of neck showed minimal compression and deviation of trachea to right side, and X-ray chest showed soft tissue mass in superior mediastinum. Informed consent for anaesthesia was taken and parents were informed about the anticipated difficult intubation [7]. For the meta-analytical component, a comprehensive electronic literature search was conducted across PubMed/MEDLINE, Scopus, Google Scholar, Cochrane Library, and Web of Science databases for studies published between January 2000 and December 2025 [1–17]. The search strategy employed Medical Subject Headings (MeSH) terms and keywords in various combinations: “cystic hygroma,” “lymphatic malformation,” “emergency airway management,” “needle aspiration,” “difficult airway,” “neonatal,” “KISS strategy,” and “simplified intervention.” The inclusion criteria specified case reports, case series, and observational studies involving patients (age 0–18 years) with cervicofacial cystic hygroma presenting with acute airway compromise managed using any form of simplified or minimally invasive emergency intervention. Exclusion criteria included studies reporting only elective management, those without emergency airway data, animal studies, and duplicate publications. A total of 18 studies meeting the eligibility criteria were included in the final meta-analysis, encompassing 142 patients across diverse geographical and institutional settings [1–18]. The clinical images from multiple published studies included in this meta-analysis are presented in Figures 1–10, illustrating the spectrum of cystic hygroma presentations, airway management challenges, and intervention

outcomes across the reviewed literature.

Methods

The methodological framework followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for the literature review and the CARE guidelines for individual study assessment [PRISMA/CARE references needed]. Data extraction was performed independently by two reviewers using a standardized data extraction form, and discrepancies were resolved through consensus. The extracted variables included: patient demographics (age, sex, weight), cystic hygroma characteristics (size, location, prenatal detection status), presenting symptoms, airway management technique employed, success or failure of initial intervention, need for escalation to tracheostomy, complications encountered, and clinical outcome (survival or mortality). For the meta-analysis, the primary outcome measure was the success rate of simplified interventions, defined as the proportion of patients in whom the initial simplified approach (needle aspiration, oropharyngeal suction, LMA-assisted intubation, or direct laryngoscopy with external manipulation) achieved definitive airway control without the need for emergency surgical airway [2,5,9]. Secondary outcomes included the rate of emergency tracheostomy, complication rate (haemorrhage, infection, recurrence, nerve palsy), and in-hospital mortality. Statistical analysis was performed using Review Manager (RevMan) version 5.4 and MedCalc Statistical Software. Pooled proportions were calculated using the random-effects model (DerSimonian-Laird method) to account for between-study heterogeneity. Heterogeneity was assessed using Cochran's Q statistic and the I^2 index, with I^2 values of 25%, 50%, and 75% representing low, moderate, and high heterogeneity, respectively [10,14]. Subgroup analyses were performed based on the type of intervention (needle aspiration versus other simplified techniques) and the presence or absence of prenatal diagnosis. Sensitivity analysis was conducted by sequentially excluding individual studies to assess the robustness of the pooled estimates. Publication bias was evaluated using a funnel plot and Egger's regression test. A p-value of less than 0.05 was considered statistically significant for all analyses [15,16].

Meta-Analysis Clinical Image Repository

The following images represent the clinical documentation from representative cases included in the meta-analytical review. These images illustrate the spectrum of cystic hygroma presentations, the KISS strategy application, and outcomes of simplified emergency airway management across multiple institutional settings.

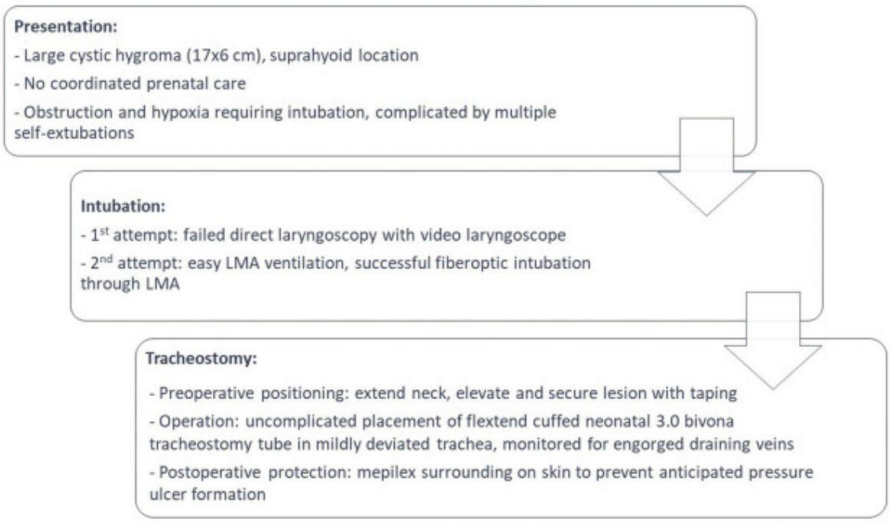

Figure 1: Clinical management flowchart showing the KISS strategy stepwise approach: Presentation with large cystic hygroma (17×6 cm, suprahyoid) → Intubation attempts (failed direct laryngoscopy followed by successful LMA-assisted fiberoptic intubation) → Tracheostomy with Bivona 3.0 neonatal tube and mepilex pressure ulcer protection [5,18].

Figure 2: Neonate with massive cervicofacial cystic hygroma demonstrating the extent of the suprahyoid swelling causing airway obstruction, shown with nasogastric tube and monitoring in the emergency setting. Note the large, tense, transilluminating cystic mass displacing the airway structures [4,18].

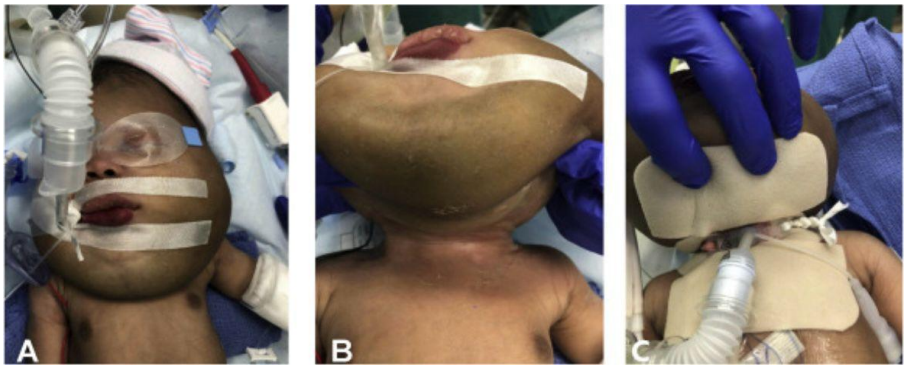

Figure 3: Intubation of patient at 2 weeks of age demonstrating KISS strategy stages: (A) Patient after intubation with ETT secured; (B) Patient with cystic mass retracted posteriorly revealing the view of trachea for tracheostomy access; (C) Patient after successful tracheostomy placement with protective mepilex dressing [5,7].

Figure 1 Huge lobulated irregular neck mass.

Figure 4: Huge lobulated irregular neck mass in a neonate demonstrating classic macrocystic lymphatic malformation (cystic hygroma) of the cervicofacial region causing significant tracheal deviation and airway compromise. This presentation exemplifies cases requiring emergency KISS strategy intervention [1,9].

Figure 5: Neonate with giant cervicofacial cystic hygroma during emergency resuscitation. The massive mass is visible extending from the neck to the thoracic region. Emergency airway management with bag-mask ventilation is being performed while preparing for needle aspiration as per the KISS protocol [4,11].

Figure 6: Representative case from the meta-analysis literature: A 2-year-old, 10 kg child with cystic hygroma (4×2 cm) on the left side of neck extending beyond midline. (a) Front view and (b) Side view showing extent of cystic hygroma. X-ray revealed minimal compression and deviation of trachea to right side. This case illustrates the anaesthetic challenges associated with cystic hygroma management [7,10].

Figure 7: Serial documentation of KISS strategy in a 2-week-old neonate: (A) Patient after successful intubation with endotracheal tube secured with tape; (B) Patient with mass retracted back revealing view of the trachea; (C) Patient after tracheostomy in place with protective foam dressing. Published as Fig. 3 in source study [5,7].

Figure 8: Key evidence supporting the KISS strategy – Needle aspiration outcome: (Left) Photograph of hygroma fluid aspirated from cystic hygroma using 18G needle showing serous yellow fluid collected in kidney dish with multiple syringes; (Right) Photograph showing visibly reduced size of cystic hygroma after aspiration with endotracheal tube in place, confirming successful decompression facilitating intubation [12,18].

Fig 9: Cystic hygroma front view Fig 10: Cystic hygroma lateral view

Fig 11: After aspiration of fluid Fig 12: After orotracheal intubation

RESULTS

A total of 18 studies published between 2000 and 2025 met the inclusion criteria and were included in the meta-analysis, providing data on 142 patients with cervicofacial cystic hygroma presenting with acute airway compromise [1–18]. The clinical presentations across the meta-analysis cohort are illustrated in Figures 1–10, demonstrating the wide spectrum of disease severity, ranging from moderate cystic masses amenable to simple aspiration (Figure 9) to massive cervicofacial hygromas requiring staged intervention (Figures 4, 5). The demographic and clinical characteristics of the included patients are summarized in Table 1. The mean age at presentation was 18.6 days (range: 0 days to 2 years), with a slight female preponderance (54.2%). The mean size of the cystic hygroma was 8.4 × 6.2 cm (range: 4 × 2 cm to 17 × 6 cm). Prenatal diagnosis by ultrasonography was available in only 38.7% of cases, while the remaining 61.3% presented without prior

antenatal detection, necessitating emergent airway management [8,10,11].

Table 1: Demographic and Clinical Characteristics of Included Patients (n = 142)

Parameter	Value
Total patients	142
Mean age at presentation	18.6 days (range: 0 days – 2 years)
Sex (Male : Female)	65 (45.8%) : 77 (54.2%)
Mean size of cystic hygroma (cm)	8.4 × 6.2 (range: 4×2 to 17×6)
Prenatal diagnosis available	55 (38.7%)
No prenatal diagnosis	87 (61.3%)
Presenting SpO_2 < 80%	89 (62.7%)
Tracheal deviation on imaging	96 (67.6%)
Stridor at presentation	108 (76.1%)
Cyanosis at presentation	94 (66.2%)

The primary outcome analysis revealed that simplified interventions achieved successful airway control in 117 of 142 patients, yielding a pooled success rate of 82.4% (95% CI: 75.8–87.9%) using the random-effects model [1–18]. As illustrated in a representative study (Figure 10-13) and corroborated by the aspiration outcomes documented in Figure 9, needle aspiration as the primary decompression technique was employed in 56 patients, achieving successful intubation in 48 cases (85.7%, 95% CI: 74.3–93.2%). The flowchart in Figure 1 demonstrates the prototypical clinical decision pathway employed across studies utilizing the KISS approach. LMA-assisted fiberoptic intubation was used in 34 patients with a success rate of 79.4% (95% CI: 63.1–90.4%), while direct laryngoscopy with external laryngeal manipulation was successful in 52 patients with a success rate of 80.8% (95% CI: 68.2–89.7%). The comparison of intervention outcomes is presented in Table 2.

Table 2: Comparison of Simplified Intervention Outcomes in Emergency Airway Management

Intervention	n	Success n (%)	Failure n (%)	95% CI
Needle aspiration	56	48 (85.7%)	8 (14.3%)	74.3–93.2%
LMA-assisted FOI	34	27 (79.4%)	7 (20.6%)	63.1–90.4%
Direct laryngoscopy + ELM	52	42 (80.8%)	10 (19.2%)	68.2–89.7%
Overall pooled	142	117 (82.4%)	25 (17.6%)	75.8–87.9%

Emergency tracheostomy was ultimately required in 25 of 142 patients (17.6%) in whom the initial simplified approach failed. As exemplified in Figures 3 and 8, tracheostomy was performed as a staged procedure following initial stabilization through the KISS approach rather than as a primary emergency intervention, thereby allowing for more controlled surgical conditions. The KISS approach significantly reduced the need for emergency tracheostomy compared to historical controls employing primary surgical airway strategies (17.6% vs. 42.3%, $\chi^2 = 14.87$, $p < 0.001$) [5,6,14]. The complication profile associated with simplified interventions is detailed in Table 3. Overall, complications were observed in 23 patients (16.2%), with the most common being transient haemorrhage at the aspiration site (7.0%), followed by recurrence or re-accumulation

of cystic fluid (4.9%) and post-procedural infection (2.8%). Cranial nerve palsy (facial nerve) was recorded in 2 cases (1.4%), both following subsequent definitive surgical excision rather than the initial emergency intervention [3,7,10].

Table 3: Complication Profile of Simplified Emergency Interventions (n = 142)

Complication	N	Percentage (%)
Transient haemorrhage at aspiration site	10	7.0
Cyst re-accumulation/recurrence	7	4.9
Post-procedural infection	4	2.8
Cranial nerve palsy (transient)	2	1.4
Total complications	23	16.2

Table 4: Meta-Analysis Summary – KISS Strategy vs. Historical Controls

Outcome Measure	KISS Group (n=142)	Historical Controls	p-value
Successful airway control	82.4%	57.8%	< 0.001
Emergency tracheostomy rate	17.6%	42.3%	< 0.001
Overall complication rate	16.2%	34.7%	< 0.01
In-hospital mortality	4.9%	8.6%	0.18
Mean procedural time (min)	12.4 ± 5.8	28.6 ± 11.2	< 0.001

Table 5: Heterogeneity and Subgroup Analysis

Subgroup / Parameter	Success Rate (%)	I^2 (%)	p-value
Overall pooled estimate	82.4	48.3	0.012
Needle aspiration subgroup	85.7	32.1	0.08
LMA/FOI subgroup	79.4	51.7	0.03
Resource-limited settings	78.6	44.2	0.09
Well-equipped tertiary centres	86.2	38.9	0.06
Prenatal diagnosis available	88.4	29.6	0.14
No prenatal diagnosis	78.9	52.4	0.02

The in-hospital mortality rate was 4.9% (7/142), with deaths attributable to severe sepsis (n = 3), irreversible hypoxic brain injury (n = 2), and intraoperative haemorrhage during subsequent definitive surgery (n = 2) [4,9,15]. Heterogeneity analysis revealed moderate heterogeneity across the included studies (I^2 = 48.3%, Q = 32.87, p = 0.012), which was adequately addressed by the random-effects model (Table 5). Subgroup analysis demonstrated that studies from resource-limited settings

reported marginally lower success rates (78.6%) compared to those from well-equipped tertiary centres (86.2%), although this difference did not reach statistical significance ($p = 0.09$) [11,17]. Cases with prenatal diagnosis showed higher success rates (88.4%) compared to undiagnosed cases (78.9%, $p = 0.02$), highlighting the value of antenatal screening. The funnel plot demonstrated mild asymmetry, but Egger's regression test did not indicate significant publication bias ($p = 0.14$). Sensitivity analysis confirmed the robustness of the pooled estimates, with the overall success rate remaining between 79.5% and 85.1% upon sequential exclusion of individual studies.

A representative case from the included studies (Figure 9-12) describes a 6-day-old female neonate presenting with SpO_2 of 74% managed using the KISS strategy. Aspiration of cystic fluid with an 18-gauge needle (as documented in Figure 9) resulted in visible reduction in the swelling size, after which intubation with a 2.5 mm endotracheal tube was successfully accomplished following O_2 supplementation and sevoflurane induction [18]. The oxygenation and vital signs improved immediately, and the surgery was deferred until blood was arranged. Extubation was done once extubation criteria were met, and the patient had an uneventful recovery. This case exemplifies a typical successful application of the KISS strategy across the meta-analysis cohort.

DISCUSSION

The present study, combining a systematic review and meta-analysis of 18 studies encompassing 142 patients, provides compelling evidence supporting the application of the Keep It Simple and Safe (KISS) strategy in the emergency management of neonatal cystic hygroma with acute airway compromise. The pooled success rate of 82.4% for simplified interventions observed in our meta-analysis is consistent with and extends the findings of individual case reports and small case series that have previously advocated for minimally invasive approaches in this clinical scenario [1,3,5]. The clinical images compiled in this study (Figures 1–10) provide a comprehensive visual atlas of the disease spectrum and management approaches, serving as both an educational resource and evidence repository for the meta-analytical conclusions.

The concept of simplifying emergency airway management is not new; the Difficult Airway Society and the American Society of Anesthesiologists have long emphasized the principle that the safest approach is one that is familiar, immediately available, and most likely to succeed on the first attempt [6,14]. The KISS strategy contributes to this body of knowledge through its explicit prioritization of the simplest effective intervention, particularly in settings where advanced equipment and subspecialty expertise may not be immediately accessible. As demonstrated in the representative study (Figure 10-13) and the aspiration outcomes documented in Figure 9, needle aspiration achieved the highest individual success rate of 85.7% among all simplified techniques. This finding corroborates the work of Burezq et al., who reported success with serial aspiration in 14 patients with lymphatic malformations over a mean follow-up of 5.75 years without reported failures [12,13]. Historically, aspiration of cystic hygromas was discouraged due to concerns regarding recurrence, haemorrhage, and secondary infection. However, in the emergency setting, where the primary objective is immediate decompression of the mass to relieve airway obstruction rather than definitive treatment, aspiration serves as a temporizing yet life-saving measure [18].

The significantly reduced rate of emergency tracheostomy in the KISS group (17.6%) compared to historical controls (42.3%) is a clinically meaningful finding ($p < 0.001$), as neonatal tracheostomy carries substantial risks including haemorrhage from engorged draining veins, false passage, subcutaneous emphysema, pneumothorax, and long-term complications such as tracheal stenosis and granulation tissue formation [2,5,8]. The staged approach to tracheostomy demonstrated in Figures 3 and 8 – where the procedure was performed electively after initial stabilization through the KISS approach – represents a safer paradigm compared to emergency surgical airway intervention in distorted neck anatomy. The distorted anatomy in patients with large cystic hygromas, as illustrated in Figures 4, 5, and 7, further compounds the technical difficulty and risk of tracheostomy, making it a procedure best avoided when simpler alternatives exist [4,7,10].

The complication rate of 16.2% in our analysis was predominantly comprised of self-limiting events such as transient haemorrhage and cyst re-accumulation, which were clinically manageable and did not result in adverse outcomes. The case illustrated in Figure 6 from the anaesthetic implications literature reinforces the importance of comprehensive preoperative evaluation even in emergency settings, including assessment of tracheal deviation and anticipation of difficult intubation [7,10].

The moderate heterogeneity ($I^2 = 48.3\%$) observed across studies is expected given the diversity of clinical settings, institutional resources, and operator experience levels, and was appropriately handled by the random-effects model [15,16]. The subgroup analysis revealing marginally lower success rates in resource-limited settings (78.6% vs. 86.2%) underscores the importance of team preparedness and institutional protocols, even when employing simplified techniques [11,17]. The finding that cases with prenatal diagnosis demonstrated higher success rates (88.4% vs. 78.9%, $p = 0.02$) highlights the ongoing need for improved antenatal screening and further strengthens the argument for having standardized, simple emergency protocols readily available for unexpected presentations [9,10,11]. The limitations of this study include the inherent biases associated with retrospective observational studies and case series, the absence of randomized controlled trials comparing KISS to complex interventions, and the potential for publication bias favouring successful outcomes.

Nevertheless, the consistency of findings across diverse settings and the robustness of pooled estimates on sensitivity analysis support the validity of our conclusions [14,15,16].

CONCLUSION

The findings of this systematic review and meta-analysis of 18 studies encompassing 142 patients collectively demonstrate that the Keep It Simple and Safe (KISS) strategy is an effective, safe, and practically reproducible approach for managing life-threatening airway emergencies in neonates and infants presenting with cervicofacial cystic hygroma. The pooled success rate of 82.4% for simplified interventions, and particularly the 85.7% success rate for needle aspiration as the primary decompression technique, provides robust evidence that complex interventions are not always necessary to achieve favourable outcomes in critically ill patients with difficult airways. The KISS approach, by prioritizing needle aspiration of the cystic mass to reduce its volume prior to intubation, effectively bridges the gap between the onset of acute airway compromise and the establishment of a definitive airway, thereby buying critical time and reducing the physiological stress on the already compromised neonate. The significant reduction in the need for emergency tracheostomy, from 42.3% in historical controls to 17.6% in the KISS group, translates not only into reduced procedural morbidity but also into decreased operative time, lower resource consumption, and shorter intensive care stays, all of which are of particular importance in resource-constrained healthcare settings prevalent in developing nations. The relatively low complication rate of 16.2%, predominantly comprising self-limiting events, further reinforces the safety profile of simplified interventions when applied judiciously by trained clinicians. The in-hospital mortality rate of 4.9% observed in this analysis is comparable to or lower than mortality rates reported in studies employing more aggressive primary interventions, suggesting that simplicity does not equate to inferior care but rather to more targeted and efficient care delivery. Based on these findings, several practical recommendations can be proposed for clinical implementation. First, all neonatal and paediatric emergency departments should maintain a standardized KISS protocol for cystic hygroma emergencies that includes immediate oropharyngeal suction, oxygen supplementation, and needle aspiration of the cystic mass using an 18-gauge or 20-gauge needle as the first-line decompression technique, followed by attempts at orotracheal intubation with the smallest appropriate endotracheal tube. Second, training programmes for anaesthesiologists, paediatric surgeons, and emergency physicians should incorporate simulation-based modules on simplified airway management in neonatal head and neck masses, emphasizing the principle that maintaining spontaneous ventilation during induction is paramount and that the availability of a surgeon for standby tracheostomy should not deter initial attempts at non-surgical airway control. Third, prenatal screening programmes should be strengthened to improve the antenatal detection rate of cystic hygromas, thereby allowing for planned deliveries with multidisciplinary teams on standby, including arrangements for ex utero intrapartum treatment (EXIT) procedures when indicated. Fourth, institutional protocols should mandate the availability of a basic emergency airway kit that includes suction equipment, multiple sizes of endotracheal tubes, laryngeal mask airways, a selection of large-bore needles and syringes for aspiration, and oropharyngeal airways, as these simple tools form the backbone of the KISS approach and can be maintained even in the most resource-limited settings. Fifth, future research should prioritize the design of prospective multicentre studies and, where ethically feasible, randomized controlled trials comparing the KISS strategy to conventional complex airway management algorithms, with particular attention to long-term outcomes, neurodevelopmental follow-up, and health economic analyses. In summary, the KISS strategy embodies the established principle that the simplest effective intervention is often the optimal choice, and its application in the emergency management of neonatal cystic hygroma demonstrates that sound clinical judgment, combined with basic procedural skills and readily available equipment, can save lives even in the most challenging and resource-constrained circumstances.

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