Cystic Hygroma

44

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44.1 Cystic Hygroma

A cyst is a fluid filled, thin walled, membranous, hollow cavity/sac (Oxford Dictionary). It is formed as a defence mechanism following repeated injury or mutation leading to uncontrolled cellular division. Hygroma is accumulation of watery fluid in a cyst.

Cystic hygroma (CH) was first described by Redenbacher in 1828. It is a cluster of cysts in the lymphatic system, due to a malformation in the embryonic stage of the fetus or an obstruction in the lymphatic system (like enlarged lymph nodes in lympho-reticulosis), restricting flow of lymph into the venous circulation. Lymph then accumulates in the lymphatic sacs in the vicinity. In a nuchal area, it collects in the jugular lymph sacs in the neck.

CH is the most common form of lymphangioma, but unlike others, it is benign, with no malignant potential. Histologically, it originates from the embryonic lymphatic vascular system.

CH is synonymous with cavernous lymphangioma, and lymphatic or chylous Cyst.

44.2 Lymphatic Circulation

CH being lymphatic in origin, it is relevant to know about lymphatic circulation in the body (Fig. 44.1).

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U. Saha (ed.), *Clinical Anesthesia for the Newborn and the Neonate*,
https://doi.org/10.1007/978-981-19-5458-0_44

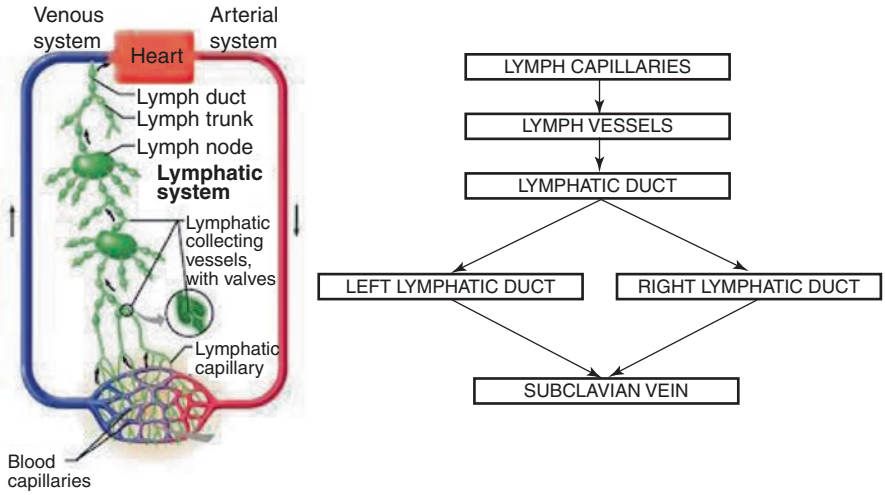

Fig. 44.1 The lymphatic system is made up of a network of thin lymphatic vessels with valves (allowing unidirectional flow) and lymph nodes. As blood flows, plasma leaks out from the blood vessels, mixes with the interstitial fluid, and is carried by lymphatics as Lymph, to the lymph nodes, where it is collected, filtered (removal of bacteria, abnormal cells) and drains into the venous system.
Lymph contains immune proteins, nutrients, and cell waste. It has an important role in immune response and disease resistance. Spleen, thymus, and tonsils are associated with the lymphatic system and immune response

44.3 Prevalence

CH can be detected in 1 in 100 fetus in the first trimester. The incidence is 1 in 800 pregnancies and 1 in 6000–8000 live births, with no gender preponderance. In 50% patients, it is present at birth, and most present in the childhood, by the age of 2 years. A very slow growing CH may present later in childhood or adults.

44.4 Location

CH being lymphatic in origin can occur anywhere within the body. Common sites are

– **Head and Neck** (face, mouth, cheek, and tongue) - 75%. About 70–80% are nuchal swellings, usually in the left posterior cervical triangle (Fig. 44.2). F**leischmann's Hygroma** is a lymphatic cyst in the floor of the mouth. This is most challenging for the anesthesiologist.
– **Axilla** - 20%.

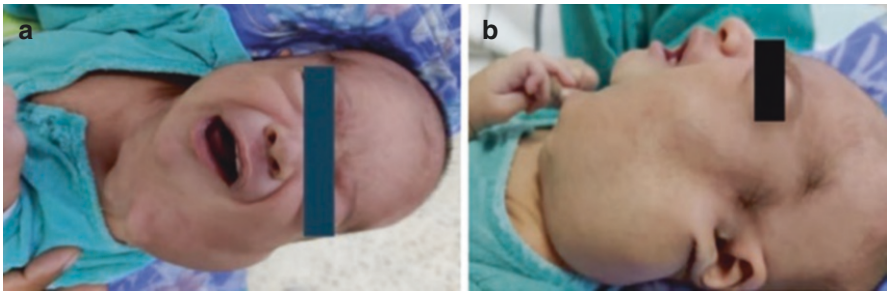

Fig. 44.2 Cystic hygroma left side of neck; (**a**) Front view (**b**) lateral view

– **Superior mediastinum and chest wall** - 5%.
– **Mesentery, retro-peritoneal, pelvis, and lower limbs** (leg, buttock, and groin).

44.5 Etiology (Table 44.1)

1. **Idiopathic** - The actual cause is **unknown.**
   Abnormal development of lymphatic vascular system, during embryonic stage, and abnormal endothelial differentiation may occur on its own or due to environmental and genetic factors.
2. **Environmental factors** include viral infections in the mother transmitted to the fetus, and maternal exposure to drugs or alcohol during pregnancy.
3. **Genetic factors** (in >50% cases). Common genetic syndromes are Turner syndrome (in 33% cases), Down syndrome, and Noonan syndrome. Other rare ones are Edward and Patau syndromes (details given below).

Lymphatic system may also be affected by **cardiac anomalies** with their consequent hemodynamic and tissue oxygenation disturbances, and anomalous lymphatic development.

Other causes such as **infections, malignancy, radiation, surgery, and trauma** may lead to occurrence of adulthood CH.

Table 44.1 Etiology of cystic hygroma

1.	Idiopathic	
2.	Environmental	Maternal viral infections and exposure to drugs and alcohol
3.	Genetic	Chromosomal anomalies and abnormal endothelial differentiation
(a)	Common syndromes	Turner syndrome Noonan syndrome Down syndrome
(b)	Uncommon syndromes	Edward syndrome, Patau syndrome
(3)	Congenital anomalies	Cardiac defects -hemodynamic and tissue oxygenation abnormalities
(4)	Other causes	Infection, malignancy, radiation, trauma, post-surgery

44.6 Various Syndromes (Table 44.1)

(a) **Turner syndrome** (45 X or 45 X0 = wholly or partially missing an X chromosome). This is not inherited disorder and occurs at random during cell division in early fetal life, in few or all cells of the body. In these females, there is abnormality in development of female features, changes in appearance, cardiac and fertility problems, and nuchal lymphogenesis.

(b) **Noonan syndrome** is an inherited autosomal dominant disorder of gene mutation that causes abnormal development of multiple body parts, with unusual facial features, short stature, cardiac defects, bleeding problems, skeletal abnormalities, and CH.

(c) **Down syndrome** (Trisomy 21 - extra chromosome 21) is not an inherited disorder. Composition of dermal collagen is altered which affects physical and mental development. These patients have typical facial features, intellect deficit, and learning disabilities.

(d) **Edward syndrome** (or Trisomy 18) - is not an inherited disorder but happens preconception, at random during egg or sperm formation by the process of disjunction. Many parts of the body are affected. Babies are born small, have cardiac defects, clenched fists, and overlapping fingers. Most babies die before or shortly after birth. They rarely survive 1 year of age.

(e) **Patau syndrome (**Trisomy 13) - is a rare serious genetic disorder in some or all cells of the body. Most babies die within 1 month of age or by 1 year of age. This is not an inherited disorder and occurs at random during cell division in early embryonic life. Babies have polydactyly, deformed feet (rocker bottom feet), holoprosencephaly (failure of brain to divide into two halves), microcephaly, mental deficiency, and microphthalmia.

44.7 Detection/Diagnosis

44.7.1 Prenatal Diagnosis

(a) **Ultrasound** – A routine **ultrasound** at 20 weeks of gestation may detect CH.
(b) **Genetic testing -** Karyotyping and α-fetoprotein levels by chorionic villus sampling and amniocentesis. **High alpha fetoprotein levels are suggestive of CH.**
(c) **Frequent ultrasounds** to watch for growth, changes in the cyst, and for complications.
(d) **Oligo/poly hydramnios** should alert the obstetrician for suspicion of CH.

Large cyst in the neck may cause death in Utero or at birth due to airway obstruction. Once detected, elective Caesarean section is planned at 38 weeks.

44.7.2 Postnatal investigations

Ultrasound, fluoroscopy, X ray neck, chest, CT scan, and MRI are done to confirm the antenatal diagnosis, and to see any changes in size and extension.

CT picture may show multiple fluid-filled loculi in the neck with tracheal compression and deviation.

Fast spin MRI provides better and more detailed image but is expensive.

To assess cardiopulmonary involvement, **angiography and ECHO** may be needed.

44.7.3 Presentation

Signs and symptoms depend on the size and anatomical location of the CH.

1. **Asymptomatic** – In a newborn, it may appear as a bulge under the skin, of slight bluish discoloration. It is a painless, non-tender, soft, cystic mass with facial disfiguration and neck extension and deviation.
2. **Symptomatic** - Lymphatic tumors progressively grow, enlarge, and become symptomatic. Depending on the rate of growth, patient may become symptomatic in the neonatal period or in childhood or later. Symptoms depend on its location.
   (a) **CH in the neck** – symptoms due to laryngo-pharyngeal compression and superior vena cava obstruction, deformity of face and neck, hyperextension and deviation of the neck, facial swelling, congestion, apnoeic attacks, breathing difficulty, stridor, feeding difficulty, and failure to thrive. Obstructive sleep apnea, difficulty in eating, and bone and teeth abnormalities occur with slow growing CH.
   (b) **Axillary or Groin CH** – difficulty in placing the limb in a normal neutral position, and risk of rupture of the cyst, infection and haemorrhage.
   (c) **CH on the chest** – chest wall deformity, breathing difficulty, infection, and bleeding.

(d) **Extension into the base of mouth** - cough, tachypnoea, breathing difficulty, chest retraction, stridor, and dysphagia (**Inspiratory stridor** = supraglottic obstruction, **Expiratory stridor** = subglottic/intrathoracic obstruction).
(e) **Mediastinal extension** may present with airway obstruction, compression and deviation of esophagus, trachea, laryngeal nerve, major vascular structures, and heart. Symptoms include severe hemodynamic compromise and respiratory obstruction, expiratory stridor, wheeze, gas exchange problems, dysphagia, and weight loss.
(f) **Complications** – If left untreated or ignored, patient may present with complications.
  – Significant cosmetic deformity.
  – Obstructive symptoms (stridor, wheeze, dyspnea, dysphagia, OSA, and nerve palsies).
  – Bleeding from injury to the skin over the cyst or its rupture.
  – Lymph discharging sinuses.
  – Recurrent infections and cellulitis.

44.7.4 Examination

- Soft cystic mass of variable size, facial deformity, head, neck, and tongue deviation.
- Signs of respiratory obstruction - laboured breathing, stridor, wheeze, and respiratory distress.
- Brilliant transillumination test.

44.8 Treatment OF CH

Outcome of a patient with CH is unpredictable because how and at what rate it grows or extends into the neighboring tissues is unpredictable. The list of treatment modalities for CH is as follows:

1. **No intervention** - Those detected early in pregnancy, often recede and disappear before birth.
2. **Observation, wait and watch** - Spontaneous regression with time occurs in some patients. In asymptomatic neonate, this is the best approach.
3. **Steroids** don't have much role.
4. **Sclerosing therapy** – intra lesion injection of sclerosing solution at weekly intervals to reduce its size and symptoms.
5. **Other modalities** - Chemotherapy, Radiotherapy, Radio-frequency ablation and Laser excision, have all been tried. They may reduce the cyst size temporarily, but it soon recurs.
6. **Surgical Excision** is the only definitive treatment. It can be done as a one stage or multistage procedure.

Remember

1. CH should never be drained or aspirated, because of risk of bleeding and infection.
2. Nonsurgical measures shrink the size of the CH and facilitate surgical dissection, but never cure completely.
3. They can be used to delay surgery in neonates till they become older.
4. Ideal age for surgery is 18 months to 2 years of age.
5. Often repetitive surgeries are needed due to its infiltrating nature.

44.9 Overall Role of Anesthesiologist

1. **Resuscitation and securing of the airway.**
2. **Diagnostic procedures – MRI, CT scan.**
3. **Sclerotherapy -** intralesional injection of sclerosing agent is a painful procedure and is done under general anesthesia.
4. **Non-surgical procedures** – Chemotherapy, Radiotherapy, Radio-frequency ablation, Laser excision.
5. **Surgical excision.**
6. **Postoperative airway management.**
7. **Anesthesia for postoperative problems and reoperation.**

Anesthetic considerations remain the same for all these procedures, except that these are usually short duration procedures, and are not corrective. So, the neonate is at a high risk of post-procedural airway obstruction and other post-surgical complications.

44.10 Indications for Surgery in Neonates

(a) Airway obstruction and respiratory distress.
(b) Feeding difficulty.
(c) Bleeding or leakage from the cyst.
(d) Multiple congenital anomalies.

44.11 Anesthetic Management

44.11.1 The Airway

As such airway management in neonates is challenging due to their **unique airway anatomy;** neck swelling further adds up because of the risk of sudden complete airway occlusion resulting in hypoventilation, apnea, and hypoxemia. A "Can't

Table 44.2 Anesthetic considerations

Preop	Induction and maintenance	Extubation and postoperative
Size/location Airway obstruction Intrathoracic extension Cong syndromes Heart defects	Premed – Atropine Avoid sedatives 100% O_2 by mask or hood NG tube and aspiration	Do not extubate ET and assisted vent – 24–48 H
Invest – CT, MRI, for extent Prophylactic steroids	CICV can occur Need to aspirate CH Maintenance of SR, gas induction, O_2 100%, Sevo/ H, attain plane of anesthesia for DL AI/ FOI Oral route No PEEP, low airway P	Complications Airway obstruction Hemorrhage Recurrent laryngeal & facial nerve injury, Cranial nerve injury -7th, 9th, 10th, 11th and 12th Infection, Injury to IJV, parotid duct, pharynx, muscles of neck Recurrence
Informed consent	Assistants	
IV line and IVF Monitoring equipment	ENT/Pead surg/cardiac surgeons	
Pead DA cart	OT prep for neonate	

Intubate, Can't Ventilate" (CICV) situation at induction is the most important complication at induction of anesthesia (Table 44.2).

The most important step in the anesthetic management is the securing of safe and reliable airway.

A detailed plan with different options for securing the airway should be sketched out prior to surgery and discussed with the assistants and surgeon.

44.11.2 Problems Frequently Encountered are Because of

a. Airway obstruction or potential for obstruction – care at intubation, anticipate CICV situation and avoid it.
b. Extension into the adjacent structures that create difficulty in securing the airway.
   - Laryngopharynx and pre-tracheal involvement.
   - Mediastinal compression or deviation of esophagus, trachea, laryngeal nerve, major vascular structures, and heart.
c. Concurrent medical diseases.
d. Concurrent congenital anomalies and associated syndromes.

e. Anemia, nutritional deficiencies, and metabolic disturbances.
f. Intraoperative invasive monitoring.
g. Airway problems intraoperatively - Accidental extubation (during neck extension), endobronchial migration of the tube (due to neck flexion and rotation).
h. Intraoperative hemorrhage and hemodynamic changes.
i. Post-operative respiratory obstruction (immediate or delayed).
j. Nerve injuries - Cranial nerves, facial, and recurrent laryngeal nerve.
k. Problems of newborn and neonate.
l. Long duration of surgery 4–6 h.

Note: Surgery for a giant CH should be undertaken in a tertiary care hospital where ENT, pediatric, and cardiothoracic surgical specialties are available along with NICU facilities.

44.11.3 Preoperative Preparation

- All neonates should undergo preoperative evaluation as thoroughly as possible, in view of the emergency nature of surgery, and asses for any invasion and its effects on the airway.
- **Informed written consent** explaining about possible difficult intubation, need for tracheostomy, and post-operative ventilation, should be obtained from the parents.
- Surgeons must explain about the risk of recurrence of the cys and other surgical complications.
- **Compression of esophagus** creates difficulty in swallowing and volume depletion. They should receive IV fluids preoperatively.
- **Compression or deviation of trachea** and difficulty in breathing necessitates intubation at birth or later.
- Newborns with huge CH may have difficulty in adapting to extrauterine environment and may have persistence of fetal circulation (PFC). The ET should be left in situ, connected to CPAP, so that adaptive changes can occur.
- Tracheal compression puts these neonates at risk of chest infection and congestion. Prophylactic antibiotics should be given.
- Feeding tube, placed orally, should be aspirated prior to induction.
- A difficult airway cart (*appendix*) with equipment appropriate for a neonate must be available (*ref Chapter on difficult airway*).
- An ENT surgeon should be at standby till the airway is secured in case of failed intubation. A surgeon must be standby to aspirate the cyst if CICV situation arises (aspiration is not routinely done as it makes surgical dissection more difficult). A cardiothoracic surgeon may also be made available.

44.11.4 Premedication

- Atropine 20 μg/kg oral/IM or 0/1 mg IV, or Glycopyrrolate, to dry airway secretions and as prophylaxis for possible bradycardia during induction and airway handling intraoperatively.
- Sedatives (midazolam 0.1 mg)/ketamine (0.5 mg/kg) may be given provided airway is secure. They are best avoided because of risk of exacerbating airway obstruction.
- Continuous O_2 by face mask.

44.11.5 Intraoperative Monitoring

Since CH lies closely to major vascular structures in the neck and thoracic outlet, massive bleeding during surgical dissection is a great risk. Blood grouping and crossmatching must be done and one unit of packed cells kept ready. This necessitates intense monitoring.

1. Noninvasive – Heart rate, NIBP, ECG, respiration, saturation, and $EtCO_2$.
2. Invasive - CVC (femoral or cubital vein) for fluid administration and packed cell transfusion, and intra-arterial line (femoral artery) for BP monitoring.
3. Temperature (rectal temperature) - Care to prevent hypothermia, due to extensive dissection, long duration, and possible blood loss must be taken (*ref chapter on thermoregulation*).
4. Urine output - Bladder catheterization.

Note – $EtCO_2$ monitoring is important as it will help detect ET problems early.

44.11.6 Induction and Intubation

Several options are available for induction and intubation, keeping the risk of occurrence of CICV situation in mind. Principles of safe induction in the neonate are as follows:

- Preoxygenation with 100% O_2 and avoidance of hypoxemia.
- Maintenance of spontaneous respiration till airway is secured.
- Avoidance of muscle relaxants.
- Inhalational induction with either Sevoflurane or Halothane is preferred over IV induction, as this allows better control of airway.
- IV ketamine (0.5 mg/kg IV) to aid induction and maintain bronchodilatation.
- Laryngoscopy and intubation in deeper plane of inhalational anesthesia.

- No blind intubation procedures or nasal route.
- If airway becomes obstructed following loss of consciousness, try to improve it by turning the patient lateral or semi-prone.
- Use oropharyngeal airway size 0. Avoid nasopharyngeal airway.
- Should the patient become apnoeic during induction, avoid IPPV. Instead use low pressure CPAP until return of spontaneous respiration. Then, try alternative methods of intubation.
- With an obstructed airway, it is difficult to achieve and maintain depth of anesthesia with inhalational agents and baby becomes hypoxic (Positive pressure ventilation via face mask does not ease obstruction).
- Needle aspiration of the cyst can help in airway maintenance, but being multilocular, one point aspiration may not be enough.
- Endotracheal tube size of 3–3.5 in a term neonate and 2.5–3.0 in a preterm neonate. A blunt ended curved stylet can help tube introduction in a partially visible glottis. Uncuffed ET to be used.
- Confirmation of intubation is done by 5-point auscultation and $EtCO_2$ monitoring to detect esophageal intubation.

44.11.6.1 Awake Intubation (AI)

- This requires great skill in a neonate, but if expertise and appropriate equipment and tubes are available, this is the best and safe option for securing the airway in a neonate with giant CH in the neck with respiratory symptoms.
- Due to reduced FRC and risk of hypoxemia, intubation time should not exceed 20 s (the apnea time).
- Neonatal fiberscopes with a O_2 port can circumvent the risk of hypoxemia while allowing time for intubation in case of difficulty.
- Ultra-thin bronchoscope over which 2.5–3 mm tracheal tube can be railroaded, can be used through LMA or directly while providing anesthetic gas mixture through another tube just inside the oral cavity.
- Rigid intubating bronchoscope aide intubation may be successful in case difficulty is encountered during fiberoptic intubation. A bougie is threaded through bronchoscope into the trachea, scope is removed, and appropriate size ET is railroaded over it.

Awake intubation may be associated with following risk:

(a) Trauma to gums, tongue, pharyngeal mucosa, and vocal cords, esp. when anatomy is not visible, and blind intubation is attempted.

(b) Stress-induced physiological changes - increase in blood pressure, heart rate, O_2 consumption, anterior fontanelle pressure, and intra cranial hemorrhage esp. in premature neonate.

44.11.6.2 Surgical Airway

Tracheostomy is the last option and should be performed by trained surgeon.

It is exceedingly difficult to reach the trachea especially if the CH is crossing over the midline. It is associated with a high risk of rupture of CH, bleeding, tracheal injury, hypoxemia, and aspiration.

44.11.6.3 Fixing of the ETT

- Sticking tapes or ribbon gauze usually used may get wet and loose from the cleaning solutions or blood under the drapes during surgery. They will also lie in the surgical field. ET should be **sutured** to the angle of the mouth to prevent inadvertent dislodgement or accidental extubation intraoperatively.
- Once ET placement is confirmed, **laryngeal packing** using wet ribbon gauze should be done around the tube to seal air leak and prevent aspiration of secretions and blood.
- Muscle relaxants and narcotic analgesics are given ONLY after securing the ET.

44.11.7 Maintenance of Anesthesia

- Balanced anesthesia with 2–4% Sevoflurane or 0.5–1% Halothane, muscle relaxants (Rocuronium 0.5 mg (repeated as and when required), analgesics (1–2 μg/kg Fentanyl) and controlled ventilation, using 40% O_2 in air or N_2O, via pediatric circuit or modified Ayre's T piece is the safest option.
- Give Prednisolone 5 mg IV as prophylaxis for airway edema.
- Ventilation should be controlled and with normal parameters (tidal volume of 5–6 mL/kg, airway pressure 12–15 cm H_2O, I:E::1:2).
- Low PEEP (3–5 cm H_2O) can be added if there is difficulty in maintaining saturation of 90–92% with an FiO_2 of 0.5–0.6.
- Excessively high intrathoracic pressure and PEEP further obstruct thoracic duct flow both by direct pressure on the duct and venous hypertension, and further increase the size of the cyst which makes surgical dissection more difficult.
- Do not ventilate using 100% O_2 for long due to risk of BPD and ROP.

Intraoperatively, anesthesiologist must be vigilant to detect ET dislodgment, endobronchial migration, obstruction or extubation.

44.11.8 Fluids and Blood Transfusion (Ref Chapter on IV Fluid Therapy)

Surgery is associated with high third space fluid losses (lymph in the cyst) and blood loss. Meticulous calculation of maintenance and replacement fluids must be done.

Blood loss must be carefully assessed. It is prudent to use a small bottle (100 mL size) as a trap in the suction line for accurate blood loss measurement.

These neonates may be anemic. Blood transfusion trigger is reached early as their allowable blood loss is zero. In a non-anemic neonate, allowable blood loss is 10% of total blood volume. Lost blood should be replaced with packed cells in 1:1 ratio, along with calcium supplement (1 mg/mL of blood) from a separate IV line (baby weighing 2.5 kg, total BV = 225 mL, 10% = 22–27 mL).

44.11.9 Extubation

After resection of the huge CH, even if the neonate meets the criteria for extubation (awake, good respiratory efforts and muscle power, hemodynamic stability), it is better to leave the ET in situ for 24–48 h and provide elective ventilation in the postoperative period, as they are at risk of delayed airway obstruction from laryngeal edema or secondary hemorrhage. On return of spontaneous respiration, ventilation can be changed to CPAP mode.

The effect of neuromuscular blockade will wear off on its own after 30–45 min. There is no need of using neostigmine and glycopyrrolate for reversal of residual neuromuscular block.

In case of injury to larynx or recurrent laryngeal nerve, babies may require intubation for a longer period with respiratory support.

44.12 Postoperative Complications

Surgical excision is associated with complications which increase the duration of hospital stay, need for NICU and ventilatory care, and re-exploration. These include the following:

1. Respiratory obstruction.
2. Hemorrhage.
3. Recurrent laryngeal and Facial nerve injury.
4. Cranial nerve damage - Injury to 7th, 9th, 10th, 11th and 12th nerves.
5. Wound infection.
6. Damage to neighboring structures – Internal jugular vein, parotid duct, pharynx, and muscles of the neck.
7. Recurrence (because of incomplete surgical excision).

44.12.1 Respiratory Obstruction

Respiratory obstruction is the most increased morbidity and even death. Causes may be:

- Secondary to reactionary edema of the airway and supraglottic edema, in initial 6–8 h of surgery.
- Airway collapse from possible tracheomalacia.
- Tongue edema.
- Rapid expansion of residual cyst due to hemorrhage.
- Edema of inflammation or cyst infection.
- Recurrent laryngeal and Hypoglossal nerve injuries.

Management

- **Reactionary edema** is a treatable cause if managed timely.
  - **Drugs** - IV dexamethasone and nebulization with racemic epinephrine.
  - **Humidified O_2.**
  - **Re-intubation** - In a neonate who has been extubated immediately after surgery, reintubation may be difficult and impossible. The usual ET size for this age is 3–3.5 id. Once laryngeal or airway edema occurs, airway becomes narrow and obstructed, and accommodate a smaller ET (size 2, 2.5).
  - **Tracheostomy** – is done if airway maintenance is required for a longer time (more than 4–5 days) but is more difficult. In an emergency, drainage of the local area may be lifesaving.
- Drains must be left in situ to prevent hematoma formation and respiratory obstruction.
- In the event of injury to hypoglossal nerve injury, tongue gets deviated, causing upper airway obstruction. The tongue must be stabilized by applying stitches at the dorsum and then traction.
- Cranial nerve injury takes a long time to heal or heal with residual deficit.
- Rapid expansion of the residual cyst (due to inflammation) requires urgent antimicrobial coverage.
- Dysphagia due to surgical interference with neural innervation to the muscles and tissues of hypopharynx and upper cervical esophagus is managed by providing feeds via the orogastric tube, parenteral nutrition, or both, until healing occurs or definitive treatment is undertaken.

44.13 Conclusion

- Though uncommon, neonates with a near fatal Giant CH can undergo successful anesthetic management for surgery, with proper evaluation, planning regarding airway management, coexisting anomalies, and postoperative complications.
- Good communication among the pediatric surgeon, anesthesiologist, ENT, and cardiac surgeons (in case of thoracic extension) is essential for efficient management.
- The key to a successful management includes identification of the potential problems, detailed preoperative evaluation with emphasis on airway assessment, and considering different options with a selection of an appropriate plan of anesthesia. Extubation should never be done in a hurry. Postoperative endotracheal tube and respiratory support can prevent airway related morbidity and mortality.
- Need for adequate fluid therapy, nutrition, and analgesia cannot be undermined.
- Recognition of potential adverse events in the postoperative period and prompt management can save life.

Contents of Difficult Pediatric Airway cart – airways (oropharyngeal and LMA), laryngoscopes (straight, curved, McCoy, and video laryngoscope), fibreoptic and rigid intubating bronchoscopes, ET tubes (sizes 2.0–4.0), stylets and bougies, Magill forceps, suction catheters, mini tracheostomy and cricothyrotomy kits, connectors of different sizes.

Further Readings

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