Surgical emphysema and pneumomediastinum following mastoidectomy

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Introduction

We describe a case of surgical emphysema and pneumomediastinum which occurred some hours after general anaesthesia for modified radical mastoidectomy. This complication is believed to have been due to the use of compressed air powered mastoid drill. Patient had neither upper airway obstruction nor haemodynamic problems. She was managed conservatively, and recovered without any complication.

Case history

A 42-year old, otherwise healthy woman was admitted for elective modified radical mastoidectomy for cholesteatoma. Surgery was done under general anaesthesia with intermittent positive pressure ventilation. Intravenous thiopentone and morphine were used for induction, and intubation was facilitated by intravenous atracurium. Intubation was done without any difficulty with 7.5 mm sized armoured cuffed endotracheal tube. No complication was encountered, and she was extubated fully awake.

Four hours later, she complained of tightening of the chest. She had facial swelling, and bilateral neck swelling up to the upper chest. Crepitations were felt over the swelling suggestive of subcutaneous emphysema. She was not dyspnoeic or cyanotic. Her heart rate was 80/min and BP was 110/80mmHg. She was breathing at a rate of 18/min. Neck xrays AP and lateral showed extensive surgical emphysema. Chest xrays AP showed displacement of the mediastinal pleura of the heart suggestive of pneumomediastinum.

She was reassured regarding her condition and monitored. Her condition gradually improved with conservative management. She was discharged on postoperative day 10 with the emphysema completely resolved.

Discussion

Surgical emphysema is almost unheard of following mastoidectomy, commonly performed by ENT surgeons using a compressed air-powered mastoid drill. Involvement of the hypopharynx sufficient to cause airway obstruction is rare [1] but may be rapidly fatal. An acute rise in intra-alveolar pressure may cause extravasation of air under

pressure into the perivascular interstitial tissue, which then dissects soft tissue planes, causing swelling and tissue compression. In the patient discussed above, air probably tracked down from the surgical field during mastoid drilling.

Surgical emphysema and mediastinal emphysema have been reported following dental procedures, and the most consistent feature in such cases was the use of compressed air-powered instrument [2]. There is a risk of surgical emphysema with possible pneumomediastinum even with a relatively simple dental procedure such as extraction of a molar tooth, especially when using air-turbine drill [3]. Repeated vomiting and accidental pharyngeal tear during nasogastric tube insertion are other circumstances where post-operative surgical emphysema are reported [4,5,6].

In the great majority of patients, subcutaneous emphysema resolves spontaneously over several days. Treatment is symptomatic, monitoring cardiac status and respiration, and providing appropriate antibiotics and analgesia. Prevention of air embolism is a primary concern, using sedatives to decrease excessive respiratory effort, stool softeners to limit valsalva maneuver, antitussive agents to suppress coughing, nasal decongestants and antihistamines to suppress nose-blowing. High flow oxygen therapy speeds resolution by facilitating resorption of nitrogen from the distended tissue and pneumomediastinum [7]. Symptoms suggestive of airway obstruction require immediate intervention. Tracheal intubation or emergency tracheostomy may be needed.

Summary

Surgical emphysema and pneumomediastinum are rare complications of mastoidectomy probably resulting from the use of a compressed air-powered mastoid drill. Early diagnosis and appropriate management according to the severity is vital.

References

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SI derived units

Other SI measurement quantities are referred to as *derived units* and are expressed as products or quotients of the 7 base units. Certain SI derived units have special names and symbols and may be used in algebraic relationships to express other derived units.

SI derived units

Quantity	Name	SI symbol	Derivation from SI base unit
Derived units			
Area	square meter	m ²	m ²
Volume	cubic meter	m ³	m ³
Velocity, speed	meter per second	m/s	m/s
Acceleration	meter per second squared	m/s ²	m/s ²
Density/mass density	kilogram per cubic meter	kg/m ³	kg/m ³
Specific volume	cubic meter per kilogram	m ³ /kg	m ³ /kg
Concentration	mole per cubic meter	mol/m ³	mol/m ³
Luminance	candela per square meter	cd/m ²	cd/m ²
Derived units with special names			
Frequency	hertz	Hz	s ⁻¹
Force	newton	N	m.kg.s ⁻²
Pressure, stress	pascal	Pa	kg.m ⁻¹ .s ⁻² (N/m ²)
Work, energy, quantity of heat	joule	J	kg.m ² .s ⁻² (N.m)
Power, radiant flux	watt	W	m ² .kg.s ⁻³ (J/s)
Electric potential	volt	V	m ² .kg.s ⁻³ .A ⁻¹ (W/A)
Electric charge	coulomb	C	A.s
Electric resistance	ohm	Ω	m ² .kg.s ⁻³ .A ⁻² (V/A)
Capacitance	farad	F	m ⁻² .kg ⁻¹ .s ⁴ .A ² (C/V)
Magnetic flux	weber	Wb	m ² .kg.s ⁻² .A ⁻¹ (V.s)
Magnetic flux density	tesla	T	kg.s ⁻² .A ⁻¹ (Wb/m ²)
Inductance	henry	H	m ² .kg.s ⁻² .A ⁻² (Wb/A, V.A ⁻¹ .s ⁻¹)

(See page 153 for SI prefixes.)