AIRWAY DIFFICULTIES ASSOCIATED WITH ANAESTHESIA IN ACROMEGALY

Three Case Reports

BY

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SUMMARY

Three cases of airway difficulties associated with acromegaly are presented. Acromegalic features, with generally thickened tissues in the upper airway, predispose to airway obstruction. This potential difficulty, especially greater during anaesthesia, has not received the attention it warrants in the anaesthetic literature. Careful pre-operative evaluation, meticulous intra-operative management, and close postoperative observation of these patients regarding adequacy of the airway are essential.

Since acromegaly was first described by Marie (1886) a number of references have been made to association of the disease with changes in voice and with alterations in laryngeal structure and function (Chapell, 1896; Neufeld, 1907; Jackson, 1918; Grotting and Pemberton, 1950; Siegler, 1952; Bhatia, Misra and Prakash, 1966). The potential difficulty in maintaining a patent airway in acromegalic patients, however, has not received the attention it warrants in the anaesthetic literature. Our experience with three recent cases illustrates the problems which may be encountered.

CASE REPORTS

CASE NO. 1

A 50-year-old female was admitted to the Yale-New Haven Medical Center because of acromegaly. She was well until 7 years prior to admission when she had noticed the gradual onset of hoarseness, the need for increasing sizes of gloves and shoes, and tingling in both hands. Two years prior to admission polyps had been removed from her vocal cords following which there was some improvement in her hoarseness. One year prior to admission fasciotomy had been performed for left carpal tunnel syndrome. Several months earlier she had consulted a dentist because of widening of the gingival space between her teeth. Endocrinological examination including pneumoencephalography and carotid arteriography revealed a pituitary tumour. The diagnosis of acromegaly was made and the decision was made to treat her by trans-sphenoidal hypophysectomy.

On admission, physical examination revealed: weight 66 kg, height 160 cm, blood pressure 100/70 mm Hg, pulse 88 beats/min and regular, temperature 37.0°C, increased finger width, large nose, moderate prognathism, spreading of lower teeth, and large tongue. Pre-operatively she was given cortisone acetate and she was scheduled for a trans-sphenoidal hypophysectomy under general anaesthesia. Premedication consisted of morphine sulphate 10 mg, hydroxyzine hydrochloride 75 mg and atropine 0.4 mg. Anaesthesia was induced with intravenous sodium thiopentone 250 mg and 70 per cent nitrous oxide in oxygen. Following oxygenation with 100 per cent oxygen, and after confirming that manual positive pressure ventilation could deliver adequate tidal volume, suxamethonium chloride 50 mg was administered intravenously and endotracheal intubation, using a size 3 Macintosh laryngoscope, was attempted. The glottic opening could not be visualized with the patient’s head in Jackson’s “classical” extended position (Jackson, 1913). Therefore, the head was placed in a “sniffing” position, the position, described by Jackson and Jackson (1934) and referred to as the “amended” position (Gillespie, 1948), in which the head is raised about 10 cm above the level of the table and is then slightly extended at the atlanto-occipital joint. In this position the distance from the teeth to the glottis is shortened. In addition the larynx is brought more posteriorly in relation to the position of the laryngoscope. This manoeuvre barely enabled visualization of the posterior portion of the larynx of this patient. It was noted that her tongue was massive, the epiglottis was thickened, and visualized posterior portion of ventricular folds and vocal cords were enlarged with an extremely narrow opening between the vocal cords. An endotracheal tube with external diameter of 11 mm was inserted with much difficulty. Immediately before the surgical incision, the right nostril was packed with gauze soaked in 4 ml of 0.25 per cent phenylephrine, and 3 ml of 1:100,000 adrenaline was injected subcutaneously along the site of incision for haemostasis. Anaesthesia was maintained with 70 per cent nitrous oxide in oxygen, intravenous morphine sulphate 10 mg and tubocurarine 45 mg. Hydrocortisone 100 mg was injected intravenously. The intra-operative course was uneventful. At the conclusion of the procedure neostigmine 3 mg and atropine 1 mg were administered intravenously. Before removal of the endotracheal tube, the patient’s tidal volume was 400 ml, and her maxi-

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mum inspiratory force was —30 cm H₂O. Anaesthesia and operating times were 4 hours 15 minutes and 3 hours 35 minutes, respectively. Before the patient left the operating room she was awake, responding to vocal commands and able to lift her head off the table. On arrival in the recovery room vital signs were stable, and there were no signs of respiratory difficulty. Gradually, however, the patient developed noisy respiration. A surgical house staff-man interpreted this as wheezing, and aminophylline 500 mg was administered intravenously 45 minutes postoperatively. Difficulty in respiration continued to increase and she became agitated. Because of agitation, pethidine 25 mg was administered intravenously by the surgical team. Ten minutes later respiration suddenly ceased and no cardiac action could be detected. External cardiac massage, endotracheal intubation and artificial ventilation with 100 per cent oxygen were immediately instituted and there was prompt resumption of cardiac action. Tracheostomy was performed, the endotracheal tube being removed as the tracheostomy tube was inserted. Ventilation was then assisted via the tracheostomy. The remaining post-operative course was benign. The patient showed no neurological deficit. The tracheostomy tube was removed on the 4th postoperative day and the patient was discharged on the 12th postoperative day.

Case No. 2.

A 62-year-old female was admitted because of acromegaly. Six months before the admission she had undergone surgery for removal of a renal calculus. At that time the physician noted acromegalic features, although the patient was not aware of the gradual change in her appearance. She did recall, however, that she had to discontinue wearing rings 2 years ago because they no longer fitted her fingers. Photographs taken in 1957 showed that acromegalic features were recognizable at that time but they had subsequently become more pronounced. Endocrinological examination including skull films revealed a pituitary tumour. The diagnosis of acromegaly was made and decision was made to treat her by trans-sphenoidal hypophysectomy.

On admission, physical examination revealed: weight 71.1 kg, height 170 cm, blood pressure 120/80 mm Hg, pulse 88 beats/min and regular, and temperature 37.0°C. She had typical acromegalic features with prognathism, enlarged nose, hands, feet and head. Pre- and intra-operative management of this patient was similar to that of the first case, except for the fact that there was relatively normal opening between the visualized posterior portion of the vocal cords. Anaesthesia and operating times were 5 hours 25 minutes, and 4 hours 20 minutes, respectively. Since there was a sufficient glottic opening visualized at the time of laryngoscopy, the endotracheal tube was removed at the completion of the procedure in spite of the laryngeal involvement in the acromegalic process. On arrival in the recovery room her vital signs were stable. The patient's airway was observed closely during the immediate post-operative period. Her recovery was uneventful and she was discharged on the 9th postoperative day.

Discussion

The large tongue and the generally thickened tissues in the upper airway, which are features of acromegaly, reduce the ratio of airway space to tissue mass, and predispose to airway obstruction. The lack of previous report in the anaesthetic literature concerning the airway difficulty associated with acromegaly prompted this report. The first case of acromegaly with laryngeal symptoms was reported by Chapell (1896). He noted that while the patient remained quiet respiration was only slightly impaired but that excitement produced laboured breathing and a crowing sound during both expiration and inspiration. During one of these attacks of dyspnoea the patient died. Since then additional reports of acromegaly with laryngeal symptoms have appeared (Neufeld, 1907; Jackson, 1918; Grotting and Pemberton, 1950; Sigler, 1952; Bhatia, Misra and Prakash, 1966), emphasizing that physical examination of the upper airway of these patients frequently reveals prognathism, thickened lips and tongue, a large nose, a larynx found to be enlarged by external palpation, coarse voice, congestion of the mucous membrane of the larynx, thickening of epiglottis, aryepiglottic folds, ventricular folds, vocal cords, arytenoid cartilages, and very small opening between the vocal cords. Fixation of the vocal cords has also been reported (Grotting and Pemberton, 1950; Sigler, 1952) and may offer an
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Additional cause of airway difficulty during anaesthesia. A possible cause of the fixation of the vocal cords is paralysis of the recurrent laryngeal nerve through stretching by overgrowth of the cartilaginous structures, and/or interference with the movement of the cricoarytenoid joint.

In the first case, since she had marked alteration in her voice, a more careful pre-operative assessment of the upper airway should have been carried out. The laryngeal involvement associated with the acromegaly was the major contributing factor in producing respiratory and cardiac arrest during the immediate postoperative period in this patient. Postoperative oedema of the vocal cords, following a difficult endotracheal intubation and instrumentation trauma was, in the presence of hypertrophy of the laryngeal structures, enough to cause almost complete laryngeal obstruction. When the patient became agitated, air flow became turbulent, adding further to the difficulty of moving air through an extremely narrow glottic opening. The failure by a surgical house officer who was attending this patient to recognize the airway obstruction was the important defect in management of this particular case. The ill-advised administration of a narcotic resulted in respiratory depression with severe hypoxaemia, cardiac cessation and respiratory arrest. In retrospect, since extreme narrowing of the glottic opening was noted at the time of endotracheal intubation, tracheostomy should have been performed at the end of operative procedure. The second case was similar to the first in that there was extreme narrowing of the glottic opening. Because of our experience with the first case, the second case was managed by performing tracheostomy as a prophylactic measure. The third case illustrates moderate involvement of the larynx by acromegaly which made the endotracheal intubation extremely difficult. Since the glottic opening when visualized at the time of endotracheal intubation appeared to be adequate, the third case was managed without prophylactic tracheostomy. The majority of patients with acromegaly belong to this category. In all three cases, the "sniffing" position rather than the classical extended position of the head enabled a portion of the larynx to be visualized.

The alteration of voice frequently observed in acromegalic patients may, in part, be due to changes in the resonating cavities secondary to hypertrophied oral and nasopharyngeal structures. The anaesthetist who encounters an acromegalic patient with voice changes should be alerted to the possibility of involvement of larynx with narrowing of the glottic opening. Pre-operatively, a careful assessment of the upper airway should be carried out. This could be accomplished by means of radiographic studies of the head and neck to estimate the airway-tissue ratio, and/or by examination of the pharynx and larynx indirectly by mirror. Intra-operatively, if difficulties in airway maintenance are anticipated during anaesthesia, awake oral intubation under topical anaesthesia or pre-operative tracheostomy should be considered. Awake nasal intubation under topical anaesthesia is another alternative, although this will make the surgical procedure of transnasal hypophysectomy difficult. A difficult intubation is not necessarily made easier by having the patient conscious. However, with adequate topical anaesthesia and sedation, awake intubation may be performed with surprising ease. If the awake intubation is found to be difficult, a well-managed induction with a plentiful supply of oxygen has many advantages. Since there is an abundant blood supply to the face, a relatively large dose of vasopressor is usually administered locally for the purpose of aiding haemostasis. This adds to the hazard of cardiac arrhythmia under general anaesthesia. In this regard, the morphine-nitrous oxide-tubocurarine technique seems to be the most satisfactory, in spite of the airway difficulty to be anticipated in the early postoperative period in these patients. Continuous monitoring of the electrocardiogram is essential, especially if other anaesthetics with greater bathmotropic effect are used. Postoperatively, laryngeal obstruction must be anticipated and prophylactic tracheostomy considered prior to the removal of the endotracheal tube if the laryngeal stenosis is pronounced. The importance of immediate postoperative management by anaesthetist, in addition to that by surgical team, is to be emphasized.

REFERENCES


**OBSTRUCTION DES VOIES RESPIRATOIRES EN RELATION AVEC UNE ANESTHESIE CHEZ DES SUJETS PRESENTANT UNE ACROMEGALIE: ETUDE DE TROIS CAS**

Il est fait etat de trois cas d’obstruction des voies respiratoires en relation avec une acromegalie. Les caracteristiques de l’acromegalie qui comportent generalement l’existence d’hypertrophies tissulaires au niveau des voies respiratoires superieures, predisposent a une obstruction des voies aerienne. Cette difficulte potentielle, particuliere importance au cours de l’anesthesie, n’a pas reçu toute l’attention qu’elle merite dans la litterature relative a l’anesthesiologie. Une estimation soigneuse pre-opératoire, la mise en oeuvre de soins meticuleux au cours de l’intervention et une surveillance attentive de ces malades aprés l’intervention, en ce qui concerne l’integrite fonctionnelle des voies aerienne, s’avèrent essentielles.

**SCHWIERIGKEITEN VON SEITEN DER LUFTWEGE WAHREND DER ANESTHESIE BEI AKROMEGALIE: BERICHTE ÜBER DREI FÄLLE**


**TRASTORNOS EN LAS VIAS AEREAS ASOCIADOS CON LA ANESTESIA EN ACROMEGALIA: COMUNICACION DE 3 CASOS**

Son presentados tres casos de trastornos en las vías aéreas asociados con acromegalia. La morfología acromegálica, con engrosamiento general de los tejidos en la vía aérea superior predispone a la obstrucción de la vía aérea. Esta dificultad potencial, aumentada especialmente durante la anestesia, no ha recibido atención que merece en la literatura anestesiológica. Son esenciales una cuidadosa evaluación preoperatoria, un cuidado intraoperatorio meticuloso y una estrecha observación postoperatoria de estos pacientes en cuanto a la suficiencia de su vía aérea.

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**INTRACTABLE PAIN SOCIETY**

At a meeting of the above Society in Birmingham on Saturday, November 6, 1971, the following Officers were elected:

**President:** Dr M. Swerdlow. **Treasurer:** Dr J. Challenger. **Secretary:** Dr M. Churcher.

The Society is open to Membership to those actively engaged in the relief of intractable pain. Those interested should contact:

Dr Churcher, Department of Anaesthetics, Plymouth General Hospital, Plymouth.