Anaesthetic complications of acromegaly

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The anaesthetic risks of acromegaly include difficulties in airway management, hypertension, and cardiac, gastrointestinal and renal problems. To estimate the incidence of major complications in this rare group of patients, we reviewed 28 patients with acromegaly who had pituitary tumour excision over a 10-yr period. Each patient was matched for age, weight and sex to a non-acromegalic patient undergoing transsphenoidal pituitary surgery. Acromegalic patients received significantly more fentanyl and midazolam and less thiopental and succinylcholine than controls (all \( P < 0.05 \)). Mean arterial pressure (baseline, minimal and maximal values) was higher in acromegalic patients than in controls. There was no difference between groups in the use of vasoactive drugs. \( P_{aO_2} \), \( F_{IO_2} \) and \( P_{aCO_2} \) were similar in both groups. Arterial pH was significantly lower (\( P = 0.015 \)), blood glucose was higher (\( P < 0.001 \)) and fluid intake minus output was higher (\( P = 0.04 \)) in acromegalic patients than in controls. Airway difficulty and tongue enlargement were encountered more often in acromegalic patients (\( P = 0.002 \) and \( P = 0.01 \), respectively).

Our data confirm that in acromegalic patients: airway difficulties occurred more frequently; severe haemodynamic instability did not typically occur during surgery for acromegaly; pulmonary gas exchange was not altered during operation; glucose intolerance may be an intraoperative problem; and fluid regulation may be altered.

Keywords: complications, acromegaly; surgery, neurological

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Acromegaly has been recognized since ancient times and was described as a distinct clinical syndrome by Marie in 1886. The aetiology of the disorder was identified as pituitary dysfunction by Cushing in 1909. The constellation of features is well described and encompasses almost all major organ systems. Previous anaesthetic studies have focused specifically on airway difficulty during induction in patients with acromegaly. Acromegaly has also been associated with diabetes, cardiovascular disorders, pulmonary dysfunction and myopathy. No report has focused on overall anaesthetic morbidity involving these organ systems. The purpose of this retrospective study of acromegalic patients was to determine the incidence of difficulties in anaesthetic management associated with organ systems other than the airway, in addition to assessing airway-related morbidity.

Patients and methods

Approval for the study was obtained from the Institutional Review Board. Charts of patients with acromegaly who had transsphenoidal pituitary tumour excision over a 10-yr period were examined for evidence of preoperative hypertension, diabetes and cardiomegaly, and patient sex, age and weight were recorded. Anaesthetic complications were noted, including: requirement for fibreoptic intubation; difficult intubation (defined as >1 laryngoscopy attempt); large tongue; airway difficulty; >20% change in arterial pressure or heart rate; and ability to extubate the trachea in the operating room. The anaesthetic agents used were detailed. Arterial pressure variables recorded included systolic, diastolic and mean arterial pressures. Initial, minimal and maximal arterial pressures and heart rate readings were noted for each patient. In addition, blood glucose and fluid intake and output were recorded.

The 28 acromegalic patients were compared with 28 control patients matched for age, sex and weight, all of whom underwent transsphenoidal pituitary resection surgery but did not have acromegaly.

Statistical analysis

For dichotomous variables, McNemar’s test for correlated proportions was used. These variables included: hyperten-
Discussion

for 0.000 0.015 0.15 0.12 < 0.0001 0.04

Table 2 Anaesthetic complications and intraoperative monitoring (mean (SEM) or number)
Anaesthetic complications of acromegaly

Cardiac complications in acromegalic patients have been well described. Acromegaly usually involves cardiac tissue and can occur with or without coexisting hypertension. The incidence and severity of cardiac hypertrophy relates to the duration of the disease, but there are no data to support a relationship between the degree of cardiac enlargement and GH concentrations. Cardiomegaly was found to be disproportionate to other organ hypertrophy in a prospective study of autopsy data. There is little evidence to support the notion that there is accelerated atherosclerosis in this population. There is a higher incidence of small vessel disease and lymphomononuclear infiltration than in the normal population but the significance of these findings is unclear.

In our acromegalic study population, we observed a higher incidence of pre-existing hypertension and cardiomegaly. However, there was no evidence of a major effect during operation in terms of haemodynamic changes nor were there any differences between groups in the use of vasoactive drugs such as ephedrine or trimethaphan. None the less, acromegalic facies is well known, the changes are so insidious that few patients seek treatment secondary to appearance changes. The symptoms of excess GH secretion often pre-date the changes from pituitary enlargement and include diabetes mellitus, hypertension, heart disease (including left ventricular hypertrophy, congestive heart failure and global cardiomegaly), osteoarthritis, amenorrhea, skin tags, colonic polyps, hyperhydrosis, carpal tunnel syndrome and sleep apnoea. Acral enlargement leads to the familiar features of the acromegalic. The coarsening of features with bony proliferation can concomitantly involve macroglossia, prognathism with malocclusion and hypertrophy of the laryngeal soft tissue, epiglottis and aryepiglottic folds. The constellation of physical manifestations, especially heart and lung disease, combined with upper airway involvement, make these patients a particular concern to the anaesthetist. Because of the rarity of the disease, there may be a tendency to over or underestimate the potential problems.

Airway management may reflect a prospective bias in the neuroanaesthetists’ practice.

Acromegaly involves oversecretion of growth hormone (GH) which can result from oversecretion of growth hormone releasing hormone (GHRH) from the hypothalamus or oversecretion of the hormone itself from a pituitary tumour. There are also a few malignant tumours that synthesize GH. Testing for blood concentrations of GH is important diagnostically, but the clinical manifestations are the same whatever the source. The incidence of acromegaly is approximately 3–4 per million per year, with a prevalence in the population of approximately 50–70 cases per million; thus prospective studies are almost impossible to perform. Cases are equally distributed between the sexes and patients are usually diagnosed when aged 40–50 yr. The clinical manifestations include somatic changes in addition to local changes secondary to pituitary enlargement. The somatic changes are caused by the effects of GH on growth and on insulin metabolism. While the classic acromegalic facies is well known, the changes are so insidious that few patients seek treatment secondary to appearance changes. The symptoms of excess GH secretion often pre-date the changes from pituitary enlargement and include diabetes mellitus, hypertension, heart disease (including left ventricular hypertrophy, congestive heart failure and global cardiomegaly), osteoarthritis, amenorrhea, skin tags, colonic polyps, hyperhydrosis, carpal tunnel syndrome and sleep apnoea. Acral enlargement leads to the familiar features of the acromegalic. The coarsening of features with bony proliferation can concomitantly involve macroglossia, prognathism with malocclusion and hypertrophy of the laryngeal soft tissue, epiglottis and aryepiglottic folds. The constellation of physical manifestations, especially heart and lung disease, combined with upper airway involvement, make these patients a particular concern to the anaesthetist. Because of the rarity of the disease, there may be a tendency to over or underestimate the potential problems.

Fig 1 Physiological variables. Baseline, minimal and maximal values for heart rate (HR), systolic (SAP), diastolic (DAP) and mean (MAP) arterial pressures before and during operation. Values are mean (SEM); boxes indicate 25–75th percentiles and ‘whiskers’ the largest and smallest values. *P<0.05, **P<0.01 between groups.
This was noted in our patients, with blood glucose concentrations being significantly higher in acromegalic patients compared with controls. This finding may be important, as hyperglycaemia is known to worsen some types of cerebral ischaemia. We also observed lower urine output in acromegalic patients, despite comparable i.v. fluid volumes during operation. Potential causes of these differences, relative to the control group, include preoperative hypovolaemia, lower cardiac output, fluid volume dysautoregulation and/or renal dysfunction. These data indicate mild intraoperative metabolic problems with acromegaly.

Our data support previous observations that airway difficulties are more common in patients with acromegaly. Pre-existing cardiovascular problems are more frequent but, taken as a group, the extent of intraoperative changes in arterial pressure and heart rate were not major causes of morbidity during anaesthesia. Mild perioperative metabolic problems occur in acromegalic patients with respect to blood glucose and fluid balance.

References