DIFFICULT DIRECT LARYNGOSCOPY COMPLICATING INTUBATION FOR ANAESTHESIA

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With the advent of relaxant agents in anaesthesia, making direct laryngoscopy easier, the employment of endotracheal anaesthesia has increased rapidly during the past decade.

Laryngoscope design has been modified to simplify further the manoeuvre of laryngoscopy (Macintosh, 1943), and the position of the head and neck which brings the axes of the larynx, pharynx, and mouth into line has been described (Bannister and Macbeth, 1944; Gillespie, 1948), so that most endotracheal intubations provide no difficulty. There are, however, occasional cases in which direct laryngoscopy presents great difficulty. The following cases are worth reporting for this reason. It proved impossible to intubate one of these patients orally by the means available, while in the other four intubation was time-consuming.

Case Reports

Case 1.—A man aged 22 presented with bowel obstruction. Preliminary inspection of the face revealed nothing abnormal, but further examination disclosed a full set of prominent teeth, restricted opening of the mandible, and a thick neck. Dorsiflexion of the head was very limited. An attempt at direct laryngoscopy revealed only the dorsal part of the arytenoid cartilages. Had a curved introducer been available intubation might have been successful. During three succeeding anaesthetics direct laryngoscopy proved impossible. As a result of this case introducers were made for subsequent use. X-ray examination of the patient's skull revealed: (1) overgrowth of the premaxillary and alveolar regions; (2) increased distance from the upper incisors to the posterior border of the ramus of the mandible; (3) increased alveolar-mental distance; and (4) bony protrusion of the chin.

Case 2.—On examination this patient, a married woman aged 35, presented no obvious facial abnormality. Direct laryngoscopy provided a view of the most dorsal part of the arytenoids. Intubation was accomplished with great difficulty employing a curved introducer.

X-ray examination of her skull revealed: increased distance from the upper incisors to the posterior border of the ramus of the mandible, and dental overbite and overjet in the incisors.

Case 3.—This patient, a married woman aged 36, presented no obvious facial abnormality, but her larynx could not be seen. An endotracheal tube was inserted with difficulty by means of a curved introducer. X-ray examination revealed: (1) overgrowth of the premaxilla; (2) increased distance from the upper incisors to the posterior border of the ramus of the mandible; (3) dental overbite and overjet; (4) short descending ramus of the mandible; and (5) obtuse angle of the mandible.

Case 4.—This patient, a man aged 39, had a large mandible, so that his jaw movement was limited even with dorsiflexion of the head. His larynx could not be seen,

and an endotracheal tube was inserted with difficulty by means of a curved introducer. X-ray examination showed: (1) relative overgrowth of the premaxilla; (2) increased distance from the upper incisors to the posterior border of the ramus of the mandible; (3) unusually increased alveolar-mental distance; and (4) an obtuse mandibular angle.

Case 5.—This patient, a man aged 44, presented no obvious facial abnormality. His teeth received pre-operative attention, but no source of difficulty in direct laryngoscopy was suspected. His larynx could not be seen, and he was intubated with much difficulty by means of a curved introducer. A lateral photograph suggested an abnormality partly similar to Cases 3 and 4—that is, an obtuse mandibular angle. The body of the mandible was short, so that the chin receded.

Discussion

The causes of difficult intubation have been commented on by several authors (Macintosh and Bannister, 1952; Lee, 1953). They are: (1) Short muscular necks with a full set of teeth, Case 1. (2) Receding lower jaws, Cases 3, 4, and 5, with obtuse mandibular angles. (3) Protruding upper incisors, Cases 1, 3, and 4, due to relative overgrowth of the premaxilla. (4) Poor mobility of the mandible, due to temporomandibular arthritis or trismus. In Cases 1 and 4 mobility was reduced by a relatively large mandible and a short thick neck; in Case 3 by the short descending rami of the mandible. (5) Long high-arched palate associated with a long narrow mouth. This results in less space between the angles of the mandible posteriorly. To these causes may be added a further one: (6) Increased alveolar-mental distance, necessitating wider opening of the mandible during direct laryngoscopy. The accompanying diagram demonstrates the measurements made in the x-ray films.

1. Distance from incisors to posterior border of ramus of mandible. 2. Alveolar-mental distance. 3. Angle of mandible. 4 or 5. Overjet: Projection of the upper or lower incisors forward, increasing the antero-posterior space between them during molar occlusion. Overbite: Overlap of the incisors during molar occlusion.

As the curved introducer proved of such value during intubation of these patients, it is reasonable to recommend that one should always be available when intubation under direct laryngoscopy is performed. It can be made very easily from brass rod $\frac{1}{4}$ in. (3 mm.) diameter, about 12 in. (30 cm.) long, and curved to the shape of a new Magill endotracheal tube. The sharp tip should be protected by a firmly fitting rubber tube to prevent trauma to the larynx, and a sliding stop enables the anaesthetist to prevent the endotracheal tube sliding back as the introducer is manipulated.

Various types of introducer to assist the passage of an endotracheal tube have been described previously. Rowbotham (1920) employed a metal rod to insert insufflation catheters. Adriani (1947) recommended that a stylet should have rounded, non-traumatizing ends and a sliding stop, and be resilient. Caine (1948) described one made of $\frac{1}{4}$ -in. (3-mm.) wire with a bifid tip which increased the antero-posterior diameter of the tube, thus making it conform more to the shape of the glottis. Deutsch (1951) suggested that the stylet be made from malleable copper tube of 3/16-in. (5-mm.) outside diameter. The ends were plugged to avoid trauma, and a sliding collar or stop with a thumb-screw was added. This instrument would assume any curve desired by the anaesthetist and would be useful in cases similar to those described. A malleable copper rod with a sliding stop is available now (Ballantine and Jackson, 1954).

Macintosh (1949) has employed a gum-elastic catheter in difficult intubations. This is pushed 2 in. (5 cm.) beyond the end of the tube, which is threaded over it and guided by it into the larynx. Barnard (1952) has used a malleable bougie in the same manner.

Medical literature is full of complaints when old facts are rediscovered. No original claim is made regarding the above application of a curved introducer (Chaussier, 1780-1; O'Dwyer, 1885).

Summary and Conclusion

Five cases in which direct laryngoscopy and subsequent intubation were difficult are reported. The causes of the difficulty are described and the value of a curved introducer is reaffirmed.

As no report has hitherto appeared in the literature concerning this type of case and its exact abnormalities, these few examples encountered during three years' anaesthetic practice at a busy general hospital may serve to draw attention to the causes of this relatively rare but embarrassing problem for patient and anaesthetist alike.

We are grateful for the interest and ready co-operation of Professor A. Amies and Professor H. Atkinson, both of the Melbourne University Dental School, who made available detailed reports on the abnormalities shown in the x-ray films.

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SURGERY IN ADDISON'S DISEASE

BY

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Before the introduction of deoxycortone acetate (D.C.A.) in 1938 surgery was so hazardous in patients with Addison's disease that it was seldom attempted. A few survivals after surgery were reported prior to 1938, however (Rowntree *et al.*, 1931; Green *et al.*, 1933), but they were infrequent and usually followed minor procedures. Fortunately, modern substitution therapy with D.C.A. and cortisone so improves patients with adrenal insufficiency that the risks of surgery are no longer prohibitive and major operations can be performed with confidence, although careful management is still essential.

The following case of Addison's disease, with active pulmonary tuberculosis, is reported in detail because it is believed to be one of the earliest in which major thoracic surgery has been successfully completed under cortisone and D.C.A. cover and because it also clearly illustrates the management of a patient during two major operations.

Case Report

The patient, a male clerk aged 38, became ill in 1950 with progressive asthenia, anorexia, pigmentation, decreasing weight, loss of libido, and periodic attacks of diarrhoea and

vomiting. After six months of slow deterioration in health he became desperately ill and was admitted to hospital as an emergency in Addisonian crisis. On admission he was restless, confused, dehydrated, and pigmented, and exhibited rapidly progressive ascending flaccid paralysis which had begun to affect the respiratory and pharyngeal muscles. Other clinical abnormalities were buccal pigmentation, deviation of the trachea to the right, flattening of the anterior chest wall of the right hemithorax with diminished breath sounds in the upper zone, and a marked hypotension of 76/60 mm. Hg.

Investigation showed the urine to be normal; 24-hour urinary ketosteroids, 4.1 mg.; haemoglobin, 15.4 g./100 ml.; P.C.V., 44%; E.S.R. (Westergren) 3 mm./hour; serum sodium, 122 mEq/l.; serum potassium, 10.5 mEq/l.; serum chlorides, 84 mEq/l.; blood urea, 133 mg./100 ml.; alkali reserve, 17.3 mEq/l.; blood sugar, 65 mg./100 ml.; Wassermann and Kahn reactions, negative; cerebrospinal fluid, normal. An electrocardiogram showed changes consistent with the high serum potassium, and x-ray examination of the chest revealed a fibrotic lesion at the right apex with pleural calcification at the base. Sputum cultures were negative for tubercle bacilli. There was no radiological evidence of suprarenal calcification.

Intensive treatment with intravenous saline, "eucortone" (total 90 ml.), and D.C.A. produced dramatically rapid improvement, and after six weeks the patient was discharged home to continue with D.C.A., 5 mg., and salt, 10 g., daily. By this time the blood biochemistry had returned to normal and the blood pressure was 115/80 mm. Hg.

After a short convalescence he returned to clerical work, but throughout the next two years his health was only moderate and he was finally readmitted to hospital in November, 1953, complaining of persistent lethargy and failure to gain weight. The blood biochemistry proved normal except for a fasting blood sugar which was persistently low, varying between 65 and 73 mg./100 ml., and the blood pressure was 110/65 mm. Hg. In view of these findings, and as the chest x-ray film was unchanged, cortisone, 25 mg. daily, was added to the regimen of treatment, and this brought immediate subjective improvement. After only three months of good health, however, he relapsed again, and on readmission to hospital there was clinical and radiological evidence of extensive cavitation in the upper lobe of the right lung and many tubercle bacilli were found in the sputum.

Antibacterial treatment with streptomycin and *para*-aminosalicylic acid (P.A.S.) was started at once; the D.C.A. and salt were continued as before, but the cortisone was reduced to 12.5 mg. daily. When he was subsequently transferred to Harefield Hospital on July 1, 1954, having completed three months' chemotherapy, the sputum was negative for tubercle bacilli but cavitation was still present in the right upper lobe. Bed rest and chemotherapy were therefore continued (streptomycin, 1 g. thrice weekly, P.A.S., 15 g., and isoniazid, 400 mg. daily) and the Addison's disease was controlled with cortisone, 25 mg., and D.C.A., 5 mg., daily. After a further ten months' treatment, cavitation persisted in the right upper lobe and surgery was therefore advised, a right seven-rib thoracoplasty being completed uneventfully in two stages (T. Holmes Sellors) under local analgesia (A. I. Parry Brown). Anaesthesia was entirely satisfactory with "omnopon," 1/3 gr. (22 mg.), and scopolamine, 1/150 gr. (0.43 mg.) as premedication, chlorpromazine, 25 mg. intravenously, brachial plexus and paravertebral blocks with 0.4% lignocaine hydrochloride and infiltration of the operation site with 0.2% lignocaine hydrochloride. Throughout both operations 4.3% glucose with 0.18% NaCl was given by intravenous drip.

There were no post-operative complications, and twelve weeks after completion of the thoracoplasty D.C.A. was implanted subcutaneously and the daily injections were discontinued. Cortisone, 25 mg. daily, and long-term chemotherapy with isoniazid and calcium 4-benzamidosalicylate ("therapas") were being continued with entirely satisfactory results. Therapas was prescribed because, unlike some of