deposited, and, since the muscles retract, ossification may occur above the patella for two or three inches. Subsequent x-ray examinations show gradual condensation of

FIG. 5.—Case of avulsion of the quadriceps treated conservatively by immobilization of the knee on a back splint. *a*, One day after injury. *b*, Four weeks after injury. *c*, Two years after injury. Despite immobilization, the quadriceps has retracted and its lower two inches is ossified. Better results follow immediate operative repair.

the new bone and all the changes characteristic of myositis ossificans. If the knee is immobilized in extension the new bone may remain attached to the patella (Fig. 5); but if without first suturing the aponeurosis forced passive movements are carried out, the bone cells are still further separated from the patella, and large masses of free bone are produced (Fig. 6).

FIG. 6. — Untreated case of avulsion of the quadriceps, with resulting ossification above the patella. Note the resemblance to myositis ossificans.

The term "myositis ossificans" of the quadriceps is an entire misnomer; the process is purely traumatic and mechanical, and in no sense inflammatory. Far from being an inevitable complication of knee injuries, it is entirely avoidable by suturing the quadriceps back to the bone. It must be equally true that many of the cases of myositis ossificans of the elbow are simply mechanical in origin, due to avulsion of the brachialis anticus, and preventable by securing reattachment of the muscle to the coronoid process, whether by conservative or by operative treatment.

A MODIFICATION IN TRACHEOTOMY.

BY

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My object is to place on record the application of a well-known manoeuvre in a manner that does not appear to have been described previously.

Progress in anaesthetic practice has made endotracheal catheterization a commonplace. The work of Rowbotham and Magill¹ on the passage of the endotracheal catheter via the nasal cavities revealed unsuspected possibilities; and that of Magill² on the passage of the endotracheal catheter via the nose *without the assistance of vision* has further widened the application of this useful manoeuvre.

The introduction of endotracheal catheters via the nose, a proceeding that has proved most helpful in anaesthetizing patients with conditions such as trismus, has hitherto been performed after the induction of general anaesthesia; and it was obviously merely a matter of time before its potential advantages would point the way to the introduction of catheters via the nose under local anaesthesia. The occurrence recently of a respiratory emergency in the throat department of St. Bartholomew's Hospital provided an opportunity for the testing both of the possibility of the manoeuvre and of its usefulness. The history of the case is as follows.

W. D., aged 69, a big burly man with a short thick neck, was seen on June 24th suffering from severe dyspnoea with stridor, due to an intrinsic laryngeal carcinoma. A satisfactory laryngoscopy was not achieved owing to the intolerance of the patient, and to the fact that alterations in the position of the head increased the dyspnoea to an alarming degree. It was decided to perform a tracheotomy at once. The shape of the patient's neck and the intensity of the dyspnoea rendered tranquil tracheotomy problematical; and laryngotomy was contemplated as being more practicable, at any rate as a preliminary. General anaesthesia appeared to be contraindicated.

It was thought worth while to try to intubate the larynx via the nose before actually beginning the incision; and after cocaineization of the nose with a spray, the operator attempted the intubation, while the assistant held himself in readiness to perform an immediate laryngotomy if the intubation should fail. A No. 12 Porgés catheter mounted upon a stylet was successfully passed at the first essay; and after a short bout of coughing the delighted patient, speaking hoarsely round the tube, exclaimed, "This is pure Heaven! I'll remember it all my life"—not an overstatement, in view of his age and the condition from which he was suffering.

A low tracheotomy was then performed in a leisurely manner, and with an entire absence of the anxiety which usually assails the patient (and not infrequently the surgeon) during an operation of this type on a cyanosed patient with a short neck. The venous bleeding which might otherwise have been expected was noticeably absent. It turned out that the tracheal rings happened in this man to be partially calcified, and that removal of the necessary piece was somewhat difficult—a fact which would probably have intensified the difficulties of tracheotomy by the ordinary method. The coughing which usually follows upon the first perforation into the tracheal lumen was absent, because of the cocaine previously inhaled.

DETAILS OF THE METHOD.

It would seem that a great advantage in the nasal route is that while a patient suffering from dyspnoea is intolerant of any approach via the mouth, he does not resent the introduction of an innocent-looking tube into his nostril; and, provided the nasal passage and pharynx have been rendered moderately anaesthetic, he does not appear to be distressed by any groping for the larynx which may be necessary. The anaesthesia is achieved quite quickly by spraying via the nasal passages (not the mouth) during inspiration with a solution of 10 per cent. cocaine hydrochloride to which a drop of adrenaline 1 in 1,000 has been added; and the patient as a rule derives some immediate relief from the shrinking and numbing of the laryngeal mucosa. While it is a fact that a tube passed via the mouth is more likely as a rule to find its way into the oesophagus, this seems not to be the case when the nasal route is employed. The tip of the tube is usually tilted slightly forward by the cervical vertebrae, and so tends to arrive anterior to the opening of the oesophagus. If the usual bulge forward of the cervical vertebrae is lacking, the catheter point can be bent forward upon the stylet so that it presents at the larynx.

The diagram indicates the shape of catheter that was employed; but I gather that anaesthetists prefer to employ a soft rubber tube of large bore for routine use (upon patients already induced), relying upon the natural curve which is always present in such a tube, and upon small-range extensions and flexions of the patient's head to bring the tube opposite the glottis; so it may be that a soft tube might also be coaxed into the trachea even if stridor were present.

POSSIBLE APPLICATIONS OF THE METHOD.

The value of this procedure was striking in this particular case, and opens up interesting speculations as to the degree of its general utility. It should be profitable to explore its possibilities in two distinct directions: first, as

a preliminary to tracheotomy; secondly, as a measure in anaesthesia.

It is important at the outset to make it clear that the manoeuvre *does not call for special skill*. Magill has pointed out that provided the catheter is bent to the correct shape upon its stylet—roughly speaking, a capital C—it is merely necessary to lubricate it and push gently, the operator being guided largely by the intensity of the respiratory sounds heard at the proximal end of the catheter. Certainly I have been able to endorse this dictum upon two out of the three occasions on which I have tried the manoeuvre. In any case, the passage of a catheter is likely to be easier than the operation of tracheotomy; and in the event of failure the patient's chances with tracheotomy are not jeopardized.

In Respiratory Obstruction.

I have not yet attempted intubation of the larynx via the nose in the obstruction of diphtheria; but, such cases for the moment apart, I would make a strong plea for an attempt at the passage of an endotracheal catheter as a regular preliminary to the operation of tracheotomy. If it is successfully passed, what was an emergency becomes a routine; and a step is at once taken towards the elimination of operative risks in tracheotomy. Further, if intubation has been achieved with cocaine, the way is now clear for an easy induction of general anaesthesia if this should seem preferable to the use of novocain. If it should fail, neither patient nor operator is much worse off. It is possible even that cases of temporary obstruction may arise where this form of intubation may replace tracheotomy, as it sometimes does in diphtheria fever practice. This suggestion was made long ago by Dr. Magill, in a verbal communication.

For Anaesthesia in Throat Operations.

The real bugbear of general anaesthesia at the present time is no longer the risk to life, but, to doctor and patient alike, is rather the risk of post-operative vomiting. While many anaesthetists are now accustomed to give gas and oxygen for tonsillectomy provided the endotracheal catheter can be introduced after a preliminary induction with ether, the introduction of a catheter without the help of an ether induction or of the deep sleep afforded by paraldehyde—that is to say, under the influence of gas only—must be regarded as a great achievement. It is seldom, therefore, that the prospect of gas and oxygen anaesthesia throughout the operation enables us to promise the patient complete freedom from post-operative vomiting. If, however, the catheter could be introduced as a routine measure under local anaesthesia, throat operations could easily be performed under gas and oxygen anaesthesia only—that is to say, throat operations would be free from any risk of post-operative vomiting.

Before Emergency Tracheotomy.

The case above described is one of two in which I have performed endotracheal intubation via the nose under local anaesthesia without the help of vision as a preliminary to tracheotomy; but upon three other occasions I have carried out intubation of the trachea as a preliminary to emergency tracheotomy, once with gas and twice with ether.

The first case was that of a woman whose trachea was obstructed by a large carcinoma of the thyroid gland. The operation of tracheotomy proved difficult even after the intubation, and would certainly have been a terrifying ordeal without it. In the second case intubation via the nose was done as a preliminary to tracheotomy in a case of tracheal obstruction of unexplained origin—possibly a retrosternal goitre—occurring during an operation upon the tonsils. It proved unnecessary to proceed to tracheotomy, as normal respiration was restored on the patient's recovery from the anaesthetic, when the tube was removed. The third case was that of a child, aged 7, in whom the obstruction was caused by subglottic oedema following bronchoscopy for foreign body. A little gas in this weak child sufficed to permit of intubation.

CONCLUSION.

The purpose of this article is chiefly to put forward a proposal that tracheotomy should be preceded as a routine by an attempt at intubation of the trachea, with a view to rendering the operation easier and safer of performance; and that the nasal route should be chosen rather than the buccal, whether local or general anaesthesia be employed. To this end it is urged that the tracheotomy set which should have a place in every operating theatre should comprise a catheter suitably curved upon a stylet, with a spray duly charged with cocaine; and that students should be shown the manoeuvre of nasal intubation—for example, during their period of anaesthetic instruction. The acquisition of familiarity with this simple procedure should render a house-physician's first tracheotomy a less alarming affair than it sometimes proves.

REFERENCES.

- ¹ *Proc. Roy. Soc. Med.*, February, 1921, p. 17. ² *Ibid.*, December, 1928, p. 83.

THE ETIOLOGY OF HIGH BLOOD PRESSURE.

BY

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A STUDY of the published work on high blood pressure shows that many views have been put forward to account for its incidence. The following is a summary¹ of the various factors which have been held to be implicated in its etiology.

1. Hereditary influence.
2. Infection (past or present).
  - (a) Generalized systemic infections.
  - (b) Focal infections with dissemination of organisms.
  - (c) Focal infections with dissemination of toxins.
3. Intoxications (non-infectious):
  - (a) Exogenous: (i) lead, arsenic; (ii) alcohol (doubtful); (iii) diet—excess of meat, general excess, condiments, constipation.
  - (b) Endogenous.
4. Metabolic:
  - (a) Pregnancy.
  - (b) Fatigue.
  - (c) Endocrine disturbance.

It is known that high blood pressure is in most cases accompanied by arterial or renal degeneration; it is also recognized that pathological degenerations are preceded by, and are therefore presumably the result of, some form of toxæmia. Hence it is not unreasonable to suppose that high blood pressure is the result of the action of some toxic body or bodies. Since it is one of the chief functions of the liver to destroy toxic substances, it was considered that it might prove possible to show that the hepatic detoxicating functions are impaired in cases of hypertension.

On the assumption that high blood pressure is the result of a toxæmia, a considerable amount of work has been done in the past to establish the existence of a causative toxin, without its having proved possible to implicate definitely any one class of toxin, and much less any specific toxic body. For the purposes of this present investigation the most promising field in which to search for a causative toxin seemed to be among the products of protein disintegration, since it is toxic bodies of this nature—for example, indican—which are chiefly destroyed by the liver. The investigation therefore resolved itself into an examination of the products of protein metabolism, and of the ability of the liver to deal with such products.

To this end full blood analyses, with reference to nitrogen partition, were made; the hepatic detoxicating functions