teeth, due to the presence of the resulting cavity in the bone of the jaw. The character of the walls of the cavity as shown in the film quite frequently gives an indication of the rate of progress of the bone destruction. Any toxins which may be formed in these areas are necessarily conveyed directly into the lymphatic system, as the region is completely shut off from the mouth.

The third type is that in which the condition commonly known as pyorrhoea is present. The subject of pyorrhoea, or chronic general periodontitis, is so large a one that I am not now in any way attempting to deal with it. Its symptoms are well known. After a preliminary gingivitis the gums become puffy and congested in appearance. The periodontal membrane begins to ulcerate and to break down, and then the edges of the bone become necrotic. The gum margins readily bleed and pus can generally be expressed from the edges.

There is a condition of acute gingivitis, very similar to the trench mouth condition seen so much during the war, which one sees frequently nowadays, and which is commonly incorrectly diagnosed as pyorrhoea; it is a condition which is amenable to treatment, but the slowly progressive general periodontitis, the true pyorrhoea, is generally so firmly established when it is first seen that the bone is already well infected, and nothing short of the loss of the teeth and the resulting absorption of the alveolus will cure the disease. I am pretty firmly convinced that only in its earliest stages is real chronic general periodontitis curable without loss of the teeth.

Having thus briefly described the three types of dental conditions which are likely to form sources of infection, I would like to emphasize the reason why such a source may be so injurious as it probably is. To do this I would point out that the most serious infection from the mouth takes place through the periodontal membrane and its surrounding tissues. It has been demonstrated, quite conclusively I think, that there is a very complete network of lymph capillaries extending through the slender papillae at the margins of the gums which accompany the blood vessels and nerves through the connective tissues into the spaces in the bone. This being so, it is easy to see how toxic substances are conveyed from the infected gums to the lymph glands and thence to the blood stream.

The extent of the periodontal membrane is not always appreciated. If the membrane is stripped off, say, the central incisor tooth and is flattened out, it will form a triangle whose sides will measure roughly three-quarters of an inch. If this triangle is multiplied even twenty times, allowing for the previous loss of a dozen teeth, a surface as large as the palm of the hand will be covered. An ulcerating surface of this size is quite a serious matter, especially when it is remembered that the ulceration is taking place in an area from which there is little external drainage.

By means of x-ray films it is possible to form a good idea of the probability of the existence of infection from the teeth and the alveolar margins. In the normal mouth the gingival trough, which is the small depression which surrounds each tooth at the margin of the gum, is covered completely with a layer of epithelium which shuts off entirely the periodontal membrane from any contamination from the fluids of the mouth. If, from any cause, this epithelial covering is destroyed, there is no longer any protection for the periodontal membrane from the action of the organisms present in the mouth. The membrane has very little power of resistance, and the organisms soon spread deeply into the tissues, including the bone, which gradually break down. Any cause of chronic irritation may account for the destruction of the epithelium of the gingival trough, especially any cause which results in a food stagnation area being formed. Such an area may result from irregularities of the teeth, the edges of overlapping fillings or crowns, improper diet, insufficient cleaning, etc.

Dental x-ray films show quite clearly when the cortical layer of the bone of the tooth socket is beginning to break down, and the extent of the bone destruction in any individual case can be readily seen. The films also show quite clearly when there are areas of necrosis around the apices of the roots of the teeth.

In cases of general illness, where a physician or surgeon has decided that the disease is probably one of infective origin, or is one which is being maintained on account of the presence of some septic focus, if dental x-ray examination shows a probability of the presence of bone destruction, either from infection of the periodontal membrane or from the presence of non-vital teeth causing necrotic areas in the bone, then the question of the advisability of removing the teeth affected has to be considered, and the question which perplexes is, How big a sacrifice in the way of removal of the teeth is justifiable in the hope that a good general result will follow?

There is no doubt that frequently all the teeth are removed for a patient and he finds that little, if any, improvement in his general health follows; but my own experience leads me to think that very much more frequently a big improvement follows.

When discussing the subject with the patient my practice is to point out that while treatment of the dental condition might be too late to overcome the harmful effects which have been accruing for years, it might reduce them to some extent, and would almost surely check the progress of the general disease. In order to avoid subsequent disappointment the patient is at the same time made to understand that artificial dentures are at the best only poor substitutes for a natural dentition, but that they can in most instances be made sufficiently efficient to deal with a selected diet. The extent of the dental extraction operation is too big a subject to deal with in a few words, but one fact is certain—if dentures have to be worn, no teeth must be allowed to remain which are not soundly implanted in healthy bone and surrounded by firm and healthy soft tissues. The wearing of an artificial denture on gums which are at all likely to suffer from gingivitis will speedily set up the condition.

OBSTRUCTION OF SMALL INTESTINE BY GALL STONES.

A SERIES OF THREE CASES WITHOUT MORTALITY.

BY

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THE discussion on intestinal obstruction at the last Annual Meeting of the British Medical Association¹ brought out, among other interesting matters, some remarkable facts and statistics concerning obstruction due to gall-stone impaction.

The number of such cases tabulated compared with the total number of cases due to all causes is insignificant: 28 to 3,064, an astonishing proportion. These 28 cases, moreover, occurred over a period of years in the practice of seven large hospitals. The incidence works out at less than one per annum per hospital. The condition must, therefore, be regarded as extremely rare, especially in the experience of any single individual. Not less remarkable than the rarity is the high mortality: of the 28 cases no fewer than 14 died.

In connexion with the discussion the cases reported below have peculiar interest. All three passed through my hands within the space of eight years, and, contrary to probabilities from the statistics above, all recovered. I have endeavoured to bring out the main points of the cases in accordance with the analysis used in the discussion at the Annual Meeting.

CASE I.

A married woman, aged 68, on May 8th, 1925, was admitted to ward 31 (Mr. G. H. Edington's department), Western Infirmary, Glasgow, suffering from abdominal pain and vomiting of forty-eight hours' duration. The vomit was doubtfully faecal. There had been no movement of the bowel for three days. Signs of acute intestinal obstruction were unmistakable. For three years this patient had suffered periodically from pain after food, and flatulence, but there had never been jaundice.

I operated about two hours after her admission, and extracted a gall stone from the ileum twenty inches proximal to the ileo-caecal valve. The patient made a good recovery.

The stone was roughly spherical, 1 inch in diameter, and the dry weight was 140 grains.

CASE II.

On June 9th, 1924, I was called in consultation by Dr. E. R. Weir of Dunoon to see an unmarried woman, aged 68, who had been suffering from abdominal pain and vomiting for forty-eight hours. The signs of acute intestinal obstruction were complete, but the vomit was not faecal.

Operation was immediately undertaken. On inserting a hand into the abdomen I came at once upon a mass in the ileum four or five inches proximal to the ileo-caecal valve. Through a small incision in the bowel I removed a gall stone. Recovery was uneventful.

This calculus was roughly a truncated cone. The greatest length equalled the greatest breadth—namely, one and one-fifth inches. The dry weight was 180 grains.

CASE III.

A detailed account of this case has already been published in another connexion.² The operation took place on January 10th, 1917. A married woman, aged 52, had had a long experience of so-called gastric disease before intestinal obstruction manifested itself. The stone which I removed from the ileum was ovoid in shape, the greatest circumference being 5½ inches, and the weight was 636 grains. Recovery was uninterrupted.

I saw this patient recently, more than eight years after operation, when she reported well, and stated that she had had no recurrence of discomfort.

It is noteworthy how seldom these patients have earlier symptoms pointing directly to the gall bladder; that there should sometimes be complete absence of any morbid signs before the onset of obstruction is equally striking.

It is scarcely ever possible to diagnose the cause of the obstruction before operation, but during the operation the mass in the intestine is easily discovered by the exploring hand. The bowel, tightly gripping the impacted stone, shows signs of bruising by the irregular surface of the calculus, and the direction of the incision into the intestine must be determined by the injury already sustained by the intestinal coats.

On no occasion have I attempted, as advised by several authorities, to move the stone along the interior of the bowel before cutting down upon it, as I am of opinion that the less the damaged intestine is handled the better.

It is now generally believed that gall bladder and small intestine adhere together on account of an inflammatory process, and that the large calculi pass directly into the intestine through a stoma set up by a process of ulceration.

There can be little doubt that these patients, when they have recovered from the operation for intestinal obstruction, derive considerable benefit from the cholecyst-enterostomy established by this curious happening. By this means they become possessed of two outlets from the gall bladder, and a period is thereby put to this organ acting as a factory of gall stones.

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¹ BRITISH MEDICAL JOURNAL, November 28th, 1925, p. 993. ² *Practitioner*, August, 1917.

TUBERCULOSIS IMMUNIZATION.

BY

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IN the BRITISH MEDICAL JOURNAL of July 19th, 1924 (p. 102), I described a series of animal experiments in which it was conclusively shown that it is possible to give active immunization to animals against a virulent dose of tubercle bacilli.

A further series of experiments has just been concluded at the Lister Institute with the same encouraging results, and I am hopeful that in the near future the work will be extended to young children, with a view to protecting those who are in daily contact with cases of open tuberculosis.

Animal Experiments.

A large series of rabbits and guinea-pigs were used. Half of the animals were given protective doses of vaccine prepared from attenuated killed human bacilli, which had been continuously subcultured by me for sixteen years, and were quite non-pathogenic and non-tuberculo-genic. Two protective doses were given—one on July 25th, 1925, and

the other on August 1st. The whole series of animals, including the controls, were then given 0.1 mg. of virulent bovine bacilli by Dr. Schutze.

One of the rabbits and two guinea-pigs died in three weeks from septicaemia, and the whole of the controls died within three months of acute and generalized tuberculosis. The protected animals gained weight and appeared quite healthy when they were killed on February 24th, 1926. A very careful *post-mortem* examination of the rabbits was made by Dr. Schutze and myself. The animals were fat and in excellent condition. At the site of inoculation (in each case in the thigh) was an enlarged gland or glands, but not extending into the inguinal glands. There was no trace of tubercle in any of the organs. Smears from the glands showed tubercle bacilli in large numbers, and these will be injected into guinea-pigs with a view to testing their virulence. It is evident that a local infection was produced at the site of inoculation, but the animals were protected against a progressive tuberculosis.

As my previous experiments have also shown, it is only possible to protect animals by using bacilli of human origin, against an infecting dose of bovine origin, and vice versa.

Conclusions.

The problem of tuberculosis resolves itself into the question of immunity. Contrary to what is observed in other infectious diseases, no immunity is conferred on the human by a previous attack of tuberculosis, caused by the same type of bacilli. Pulmonary tuberculosis, which is nearly always caused by bacilli of the human type, does not appear to give immunity in after-life, and patients whose disease has been arrested are liable after many years to another acute attack of active tuberculosis. Clinical experience, however, goes to show that children and young adults who have received a mild infection of bovine bacilli in milk, causing enlarged glands in the neck, bone and joint lesions, and other forms of localized tuberculosis, are practically immune to pulmonary tuberculosis, and it was this observation that led me to use bovine bacilli to immunize animals and man against the more serious disease of the lungs.

It seems to be probable that children may be protected against infection in the household, but some years must elapse before this can be finally established. All children over the age of 1 year who are living in the same house with a tuberculous member of the family ought to be protected if possible against infection, and it is in the early years of life that such infection usually occurs.

From a long observation of tuberculosis I am convinced that if some active immunity can with complete safety be given to those children who are directly exposed to infection at home, a long step will have been taken in the direction of prevention, which, after all, is the key to the problem.

The protection of the community by some safe scientific method of active immunization is the only effective way by which this preventable scourge can be eradicated.

FRACTURE OF THE SKULL AND EXTRADURAL
HAEMORRHAGE WITH SYMPTOMS
OF HYPOTENSION.

BY

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THE case recorded below is of much interest, since, although there was considerable extradural haemorrhage, there was a complete absence of pressure signs. The case suggests that a haemorrhage within the skull may act not only by its own local pressure but also by its general effect on the pressure of the cerebro-spinal fluid of the brain.

A man, aged 26, was knocked down by a tram on November 27th and was taken to hospital in a comatose condition.

On admission the pulse was 100 and irregular, the temperature 38° C., and the respirations shallow. There was escape of blood from the nose and the right ear. The pupils were unequal and