however, not have changed the prognosis in these cases, as they all died).

Thus Bohn's procedure is worthy of recommendation as the criteria are simple, easy to evaluate, and seem to be reliable.

Summary

Among the 17,254 patients treated during a seven-year period, 87 had macroscopic melaena (without haematemesis) and 127 haematemesis with or without melaena.

Only one of the 87 melaena patients died (from cancer); therefore in this group surgery was not indicated.

The 127 patients who had haematemesis were treated with light diet, rest in bed, iron, and vitamin medication, and, as the period investigated advanced, to an increasing degree with blood transfusions. The diagnostic distribution is seen in Table I.

In 115 cases the haemorrhage was caused by peptic ulcer (21 of these patients died); in 12 cases the haemorrhage was due to other affections (6 died). Two of the patients with peptic ulcer died from other affections, while 19 died from their haemorrhage—that is, a mortality rate of 16.5%.

Jørgen Pedersen's criteria for surgical intervention (age over 50 years; haematemesis at hospital; recognized ulcer) were fulfilled in eight patients, four of whom died (Table II).

Bohn's criteria, which apply to patients over 40 years and which indicate surgery when two or more are fulfilled (severe haemorrhage; good evidence of a chronic peptic ulcer, particularly corpus ulcer; haematemesis at hospital) designated 47 patients, including 18 of the 19 that died from haemorrhage in peptic ulcer (Table III). The group includes three cases in which the haemorrhage was not caused by peptic ulcer. In this group the mortality from haematemesis due to peptic ulcer amounts to 40%.

It is concluded that Bohn's criteria must be regarded as suitable for determining which patients are to be subjected to immediate surgery.

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Education authorities in Scotland make provision for less than 4,000 of about 20,000 physically disabled children. Recommendations for meeting this situation have been made by the Advisory Council on Education in Scotland. The council does not think that all such children should necessarily attend special schools; on the contrary, wherever possible they should go to ordinary schools; also, the children should not be removed from their homes unless they would unquestionably benefit from being in residential institutions. The council estimates that there are nearly 16,000 children suffering from lowered vitality, and between 4,000 and 7,000 physically handicapped; epileptic children number 237. Education in day schools with special provision for diet, fresh air, and rest in convalescent and holiday homes is proposed for children with lowered vitality, and as speedy return as possible to normal conditions. Where physically handicapped children are concerned, the council recommends that medical treatment should come first. Vocational training for disabled children should be included in the curriculum towards the end of their school days. A national centre for epileptic children is advocated, and the council suggests that the school-leaving age for physically disabled and epileptic children should be 16 years. The work of the Edinburgh centre for children with cerebral palsy should be encouraged and others set up; basic research in the psychology and education of disabled children should also receive every encouragement.

THE SYNDROME OF SUPRARENAL HAEMORRHAGE IN THE ADULT

WITH A REPORT ON FOUR CASES IN ASSOCIATION WITH PREGNANCY

BY

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Haemorrhage into the suprarenal gland in the adult is not a common condition. It is a well-recognized entity in association with septicaemia in both children and adults, when it is known as the Waterhouse-Friderichsen syndrome. That bleeding can occur into the suprarenals in the absence of infection has long been known, although this condition rarely figures in the differential diagnosis of cases of acute abdominal emergency or unexplained collapse. Despite its infrequency the lesion has long been looked upon as one of considerable importance by the French, and in America Lvenson (1908) published a complete account of the syndrome with an extensive review of the literature. Yet as recently as 1949, referring to the latest reported case of this condition in pregnancy, Arnold, Richer, and Lepore wrote: "If we had thought of the possibility and properly explored the adrenal regions at the time of the first operation, perhaps the patient's life could have been saved. The case strongly emphasizes the necessity of including adrenal haemorrhage in the differential diagnosis of any uncertain abdominal situation." For this reason attention is again called to the syndrome in the hope that consideration of the diagnosis might permit successful treatment of what has almost always been a fatal condition.

The following cases, complicating pregnancy or the puerperium, have occurred in St. Mary's Hospitals, Manchester, since 1946:

Case 1

A 2-gravida aged 31 was admitted to hospital at term on the evening of April 6, 1947. The only abnormality noted in her pregnancy had been an increase in weight of 38 lb. (17.2 kg.). She was in early labour, the vertex was presenting and engaged, and the cervix was two fingers dilated. The blood pressure was 130/80 mm. Hg, pulse 72 a minute; there was no oedema or any abnormality in the urine. Labour continued slowly. At 2 a.m. on April 7 the pulse rate had risen to 120 and by 6.30 a.m. had gone up to 148. The patient did not complain of any pain beyond that due to her uterine contractions.

Abdominal examination showed the uterus to be somewhat tense, and tenderness was evident across the lower abdomen. The blood pressure was 85/50 mm. Hg; pulse 140; the foetal heart sounds could not be heard. The patient presented a generally shocked appearance with air hunger and cold skin, and was perspiring freely. Her temperature was 99.6° F. (37.55° C.). Concealed accidental haemorrhage was provisionally diagnosed, and an intravenous drip of plasma was started, followed later by whole blood. Morphine, $\frac{1}{4}$ gr. (16 mg.), was given by injection. Despite this conservative treatment steady deterioration occurred in the general condition. At 5 p.m. the pulse rate had risen to 180 and the blood pressure was 90/50 mm. Hg; the temperature was 101.6° F. (38.7° C.). Vaginal examination showed the cervix to be three-quarters dilated, the head being in the mid-cavity of the pelvis; the membranes were ruptured artificially. The patient continued to go downhill, however; the pulse became impalpable and the blood pressure fell to 60/45 mm. Hg. Respiration became more

laboured. Nikethamide was given intravenously, but without effect, and death occurred at 12.20 a.m. on April 8.

Post-mortem examination showed the uterus and placenta to be free from any abnormality. The cervix was fully dilated, the child's head being in the mid-cavity of the pelvis. The liver showed some enlargement and, histologically, scattered patches of fatty change were found, but there was no definite evidence of necrosis. The left kidney was normal; in the right kidney there was evidence of ascending pyelonephritis. Passive congestion with some areas of oedema was present in both lungs. The heart and pituitary gland were normal. Both suprarenal glands showed extensive scattered haemorrhages throughout the whole cortex and medulla.

Anatomical Diagnosis.—Bilateral suprarenal haemorrhage; right ascending pyelonephritis.

Case 2

A primigravida aged 29 had been seen regularly at the antenatal clinic. During the last trimester of pregnancy repeated unstable presentations occurred, for which she was admitted to hospital at the 38th week. While in hospital she developed pre-eclamptic toxæmia, the blood-pressure reading varying between 140/100 and 180/100 mm. Hg. Albumin appeared in the urine. In view of this and the now persistent high head, she was examined vaginally. A type I placenta prævia was found and the forewaters were ruptured. After a labour lasting 24 hours, delivery was carried out by easy low-forceps extraction under general anaesthesia. The third-stage blood loss was 10 oz. (284 ml.).

After delivery the patient's condition was satisfactory and she soon regained consciousness. One hour later, however, she collapsed, with pale moist skin, weak rapid pulse, and blood pressure of only 60 mm. Hg systolic. The uterus was contracted well and no clots could be expelled. Morphine, $\frac{1}{4}$ gr., was given by injection, the foot of the bed was raised on blocks, and an intravenous blood drip was started. Her general condition, however, did not improve. She was breathing rapidly with occasional deep sighing respirations and she showed considerable mental confusion. For this reason it was not easy to get a reliable history of pain, but she seemed to be experiencing pain towards the right side of the abdomen. Examination showed tenderness throughout this whole region, but little rigidity was felt. The fundus of the uterus was normal and contracted firmly. A vaginal examination was made, but no significant abnormality of the cervix or vaginal vault was felt.

There was still no improvement three hours after delivery. Her blood pressure remained between 50 and 60 mm. Hg systolic. Methylamphetamine hydrochloride, 20 mg., given intravenously, produced a temporary rise to 100 mm. Hg systolic, but the blood pressure soon fell again to 60 mm. Hg. A second pint of blood was given and methylamphetamine hydrochloride was repeated. No further improvement, however, occurred. Despite the risks involved it was felt that an examination under anaesthesia was necessary to exclude a uterine rupture or a minor degree of inversion of the fundus. Even should no such lesion be found, laparotomy was contemplated, as the patient was rapidly going downhill. Five hours after delivery, at midnight, under cyclopropane and oxygen anaesthesia, the uterus was explored digitally, but no abnormality was found. No evidence of intraperitoneal bleeding was present, and it was felt that nothing would be gained by laparotomy. The patient was returned to the ward in the same condition, the systolic blood pressure being 50 mm. Hg and the heart rate, counted at the apex, 190 a minute. Morphine, $\frac{1}{6}$ gr. (11 mg.), and nikethamide were given, but without avail. The patient died two hours after the digital exploration.

A routine post-mortem examination showed no significant abnormality beyond two or three tiny abscesses near the upper pole of the right kidney. Both suprarenal glands had scattered haemorrhagic areas throughout the whole of the cortex and medulla.

In both these cases the patient had presented the picture of an extremely shocked woman, the diagnosis made in Case 1 being accidental haemorrhage of severe concealed type; in the second such a catastrophe as inversion or rupture of the uterus was seriously considered.

In two cases briefly described below, suprarenal haemorrhage was found at necropsy in association with other pathological changes which appeared to be of a primary nature.

Case 3

A 5-gravida aged 39 gave the history that her first four pregnancies had ended prematurely between the 24th and 28th weeks. She was Rh-negative, no antibodies being present in the serum; the Wassermann reaction and Kahn test were negative. She was admitted to hospital on July 31, 1947, at the 38th week of pregnancy as a case of concealed and revealed accidental haemorrhage.

She presented the typical shocked appearance, with pulse 100 a minute and blood pressure 95/60 mm. Hg. She was pale and her breathing was rather distressed. The urine contained albumin. The abdomen was tense and tender; foetal heart sounds could not be heard. Conservative treatment was begun with morphine and blood transfusion, but her general condition at once became much worse. Dyspnoea became marked, cyanosis appeared, and the blood pressure fell to 60/45 mm. Hg. The blood transfusion was stopped and dextrose 5% was substituted.

Deterioration in her condition continued, however, over the next few hours. The tenseness and tenderness of her uterus became more pronounced and a diagnosis of "Couvelaire uterus" was made. At laparotomy the uterus was found to have small scattered haemorrhages in the region of the cornua, particularly on the posterior surface, though the extent of bleeding into the uterine muscle was much less than had been anticipated, and less than was thought necessary to account for her grave condition. Classical caesarean section was performed and a stillborn child was delivered. The patient's general condition did not improve, and death occurred six hours later without alteration in the clinical picture.

A post-mortem examination showed small haemorrhages present in the liver substance and on the interventricular septum of the heart, in addition to those in the uterine muscle and numerous smaller haemorrhages in the cortex of both suprarenal glands. Both lungs were found to be oedematous.

Case 4

A 2-gravida aged 30 was admitted as an emergency case on August 19, 1948, at the 38th week of pregnancy. There was a history of oedema of the feet during the previous week and swelling of the face and hands the previous day. Early on the morning of admission she was stated to have complained of dizziness and to have had a "fit" shortly afterwards. Her condition on admission was grave. She was having tonic convulsions, was cyanosed with frothy lips, and resembled a typical eclamptic. The systolic blood pressure was 180 mm. Hg. Oxygen was administered and 5 m.l. of magnesium sulphate 20% was given intravenously. Shortly afterwards, however, she collapsed and died.

Post-mortem examination showed congestion and oedema of both lungs. Haemorrhages were found scattered throughout the interventricular septum of the heart, into the liver, throughout both kidneys, and into the cortex of each suprarenal gland. The probable diagnosis made was eclampsia with haemorrhage into the suprarenal glands.

Discussion

Six cases of suprarenal haemorrhage complicating pregnancy or the puerperium have been described in the literature (Hall and Hemken, 1936; Keele and

Keele, 1942; Dodds, 1945; Hurter, 1945-6; Burnett, 1948; Arnold, Richer, and Lepore, 1949). In two of these cases bleeding occurred only on the right side; in the remainder bilateral haemorrhages were found at necropsy. Two cases complicated early pregnancy; one occurred at the fifth month, one at the eighth month, and two during the puerperium.

Hall and Hemken give no details of their case, merely stating that it occurred in a girl aged 18 during early pregnancy which was complicated by hyperemesis gravidarum. Burnett's patient was admitted to hospital immediately after an abortion at the 14th week. She was very shocked, with an imperceptible pulse and a blood pressure which could not be recorded. She experienced no pain, went rapidly downhill, and died after two and a half hours, cyanosis appearing terminally. In Keele and Keele's case of unilateral haemorrhage there does not seem to have been any predisposing cause. It was characterized by localized pain—to the right of the umbilicus about 2 in. (5 cm.) below the costal margin—vomiting, absence of fever and shock, and a normal pulse rate. A diagnosis of twisted ovarian cyst was made; laparotomy was performed, but the suprarenal region was not examined.

The case of Arnold *et al.* is in some ways similar—right-sided pain and tenderness, with a haemorrhage into the right suprarenal gland—but here there was no vomiting and the temperature and pulse were both raised. Shock was, however, absent, and acute appendicitis was provisionally diagnosed. In this case, also, laparotomy was performed, and the lesion was not discovered until a second operation four days later, when clear signs of internal bleeding became evident. A large mass which was considered inoperable was found above the right kidney. The early months of this pregnancy had been complicated by hypertension of moderate degree. The case described by Dodds showed progressive asthenia from the first day post partum, death occurring rapidly on the fourth day. The clinical picture was obscured by massive liver necrosis, which almost certainly accounted for a great many of the patient's symptoms. This pregnancy also had been complicated by pre-eclampsia during the later weeks.

Hurter's case showed no abnormality during pregnancy or labour, except for a post-partum haemorrhage of 40 oz. (1.14 litres). For the anaemia which resulted a blood transfusion was started on the seventh day. Serious symptoms of collapse, dyspnoea, and cyanosis followed the first few ounces of blood. The drip was stopped and the case treated as one of incompatible transfusion. Temporary improvement occurred at first, with rapid deterioration later, the pulse rising to 160 a minute; blood pressure was 40/20 mm. Hg, and temperature 104° F. (40° C.). Post-mortem examination showed bilateral suprarenal haemorrhage. All these cases ended fatally.

Clinical Features

In considering the diagnostic problem set by these cases it is necessary to refer to published accounts of others in which pregnancy was not a factor. Arnaud (1900) divided them into three groups:

1. The peritoneal type, in which the clinical picture resembles some acute abdominal emergency with abdominal pain and tenderness, frequent vomiting, shock, and circulatory collapse. Such a case is well described by Lavenson, a diagnosis of acute pancreatitis being made.

2. The asthenic type, in which the patient presents progressive asthenia, leading to death in a few days; Williams and Ellis (1944) describe such a case.

3. The nervous type, in which the patient is found in convulsions or coma, as described by Arnaud (Case 4) or Case 4 above. Lavenson considered the suprarenal haemorrhages to be the result rather than the cause of the convulsions. He also added a fourth type in which sudden death occurs from no obvious cause, suprarenal haemorrhage being found *post mortem*.

Keele and Keele attempted to describe more closely the syndrome, in adults, from the study of their own case and of others in which clinical details were available. They stressed pain localized to the right of the umbilicus and not radiating; tenderness in the same situation; absence of fever, shock, or raised pulse rate; copious vomiting. The fact that the haemorrhage in their case was unilateral is perhaps responsible for the difference between this case and other recorded cases. Pain would appear to be a frequent symptom, but its accurate location is disputed. It is often described as epigastric, as in cases recorded by Lavenson and Arnaud, or diffuse abdominal pain (Barsoum, 1936). Frequently the renal angle is the site of both pain and tenderness, and in the case of Edelman (1945-6) the site is no more definitely indicated than as being the right upper abdomen and loin. Occasionally, as in Case 1 and in Burnett's patient, pain is absent.

Shock and circulatory collapse are certainly absent in some cases, notably when bleeding is unilateral (Keele and Keele, 1942; Edelman, 1945-6; Arnold *et al.*, 1949); but generally these features are present, sometimes to a marked degree, as in Cases 1, 2, and 3 above, and in those of other authors (Lavenson, 1908; Barsoum, 1936; Hurter, 1945-6; Macmillan, 1947; Burnett, 1948).

Vomiting is variable, being marked in the cases of Lavenson and Barsoum and absent in those described by Williams and Ellis and Arnold *et al.* It was not prominent in the cases described here. Fever is no more reliable, temperatures ranging from subnormal in some of the shocked patients to readings well above normal in others. Respiratory distress and restlessness were noted in Cases 1, 2, and 3. A palpable mass in the region of the kidney is sometimes found, and it is worthy of note that it has been cases of this nature, described by Oddo (1946) and Edelman, 1945-6, in which successful surgical intervention has been performed. Keele and Keele stress the absence of abdominal rigidity, which appears to be in agreement with the findings of the majority of authors.

Of the various symptoms and signs which may be present, Lavenson stresses the profound degree of shock in the bilateral cases to be one of the most striking features. This is certainly in agreement with the findings in the cases presented here. It was remarked with regard to Cases 1 and 3 that, although they resembled cases of accidental haemorrhage, the degree of shock and the gravity of the condition were, if possible, greater than usually occur in even that condition.

Differential Diagnosis

Among the cases of suprarenal haemorrhage reported in the literature a great many diagnoses were made as variations in the clinical picture became apparent—acute pancreatitis (Lavenson), intestinal obstruction (Barsoum), acute appendicitis (Arnold *et al.*), twisted ovarian cyst (Keele and Keele). When a mass has been

palpated in the flank it has been regarded as an extra-peritoneal neoplasm (Edelman ; Oddo). The "asthenic" type described by Williams and Ellis occurred at the height of an influenza epidemic, the diagnosis of influenza at first being made.

The occurrence of the condition during pregnancy will raise also the possibility of concealed accidental haemorrhage or rupture of the uterus: after delivery uterine inversion may be simulated. In Cases 3 and 4, in fact, suprarenal haemorrhage appeared to exist along with accidental haemorrhage and eclampsia.

Failure to respond to the normal methods of resuscitation in the unexplained collapse, or a failure to find the expected lesion at laparotomy, should always bring the possibility of suprarenal haemorrhage to mind.

Pathology

In general, suprarenal haemorrhage may be divided conveniently into three groups:

Group 1.—In the newborn. Here trauma is often a factor, possibly in association with the involution which occurs in the foetal cortex about this time.

Group 2.—The Waterhouse-Friderichsen syndrome associated with septicaemia, usually in older children and occasionally in adults.

Group 3.—A miscellaneous group, occurring in adults. In this group many causative factors may be involved. Thrombosis of the renal vein was regarded by Hall and Hemken as the most common cause; it was also found in Keele and Keele's case. This thrombosis has itself appeared to follow suppuration in adjacent organs—the liver in two of Arnaud's cases and the pancreas in Lavenson's case. It is interesting to note that small foci of infection were present in the upper pole of one kidney in Cases 1 and 2, although no thrombus was discovered. In the case described by Dodds extensive hepatic necrosis apparently preceded haemorrhage into the suprarenals.

The lesion has followed severe burns, as described by Arnaud (1900) and others.

Macmillan's case occurred in a man with severe hypertension. In this respect, it is interesting to note that in the cases described during pregnancy and the puerperium pre-eclamptic toxæmia has been frequent. Cases 2, 3, and 4, described above, had physical signs or post-mortem findings pointing to pre-eclamptic toxæmia or eclampsia: the only sign of this in Case 1 was a slightly abnormal increase in weight. Hypertension was present in early pregnancy in the case recorded by Arnold *et al.*, and Dodds's patient developed pre-eclampsia during the latter weeks of her pregnancy.

Macmillan believes both hypertension and generalized haemorrhagic tendency to be possible causes, in which case the association of the lesion with pre-eclamptic toxæmia is not surprising. It is possible that involution of the gland during the puerperium may be an additional predisposing factor.

The extent of the haemorrhage is very variable. Lavenson quotes a case described by Rayer in which one suprarenal gland was transformed into a cyst weighing 2 kg. Oddo evacuated a quart of blood (1.14 litres) at operation; Dodds and Macmillan both found the glands enlarged many times at post-mortem examination. In other cases, as in those described above, diffuse scattered haemorrhages have been found throughout cortex and medulla.

Treatment

Successful treatment of this condition is possible. In 1924 Corcoran and Strauss recorded the case of an infant in which successful surgical intervention was carried out for unilateral haemorrhage. A mass was palpated in the left loin; operation was performed, a clot evacuated, and a bleeding-point ligatured. Goldzieher and Greenwald (1928) report the case of a newborn infant presenting typical signs of unilateral suprarenal haemorrhage, with a palpable mass in the right flank. Immediate response occurred to injections of suprarenal cortical extract, characterized chiefly by a fall in the respiratory rate from 60 to 30 a minute half an hour after the injection, together with improvement in the general condition. Continued therapy with cortical extract resulted in permanent cure with disappearance of the mass. The authors suggest that part or all of the left gland was probably uninjured, the suprarenal extract maintaining life during the time that the normal gland tissue was recovering either from shock or from reflex inhibition. They suggest also that hypertrophy may take place in the unaffected gland, or in aberrant foci of suprarenal tissue, if the patient can be carried through the initial period following the haemorrhage.

Among the adult cases that of Oddo, in 1938, appears to have been the first in which operation was successful. Unilateral haemorrhage occurred into the left gland, and, although a mass could not be palpated, an intravenous pyelogram showed downward displacement of the left kidney. Laparotomy was performed, but the condition was thought to be inoperable. At a second operation some time later, however, the mass was exposed through the loin, was incised, and a quart of blood-stained fluid was evacuated from the suprarenal gland. No further treatment was given and recovery occurred. The second successful case, that of Edelman, showed similar features—a mass in the right loin, with downward displacement of the right kidney, shown on an intravenous pyelogram. Nephrectomy, with removal of the suprarenal haematoma, was successfully performed through a lumbar incision.

This type of case, in which bleeding has occurred into one side only, would appear to be the most susceptible to treatment. It is worth emphasis that in two cases in which laparotomy was performed the renal mass was at first considered inoperable, yet in one of them simple incision and drainage of the haematoma brought about recovery.

It is suggested, therefore, that in cases in which the diagnosis of suprarenal haemorrhage may be considered in the adult or the child, the injection of suprarenal cortical extract is indicated if improvement is not occurring with the usual methods of resuscitation. Improvement in the general condition may be looked for if the diagnosis is correct, justifying continuation of cortical hormone therapy.

In cases in which a mass is palpable, or in which severe bleeding is suspected, operation may be indicated; simple evacuation of blood-clot should be attempted, even if the mass does not at first sight appear capable of removal. In this type of case, also, administration of cortical extract may be valuable.

It is likely that greater benefit will ensue from the use of crude extracts such as "eucortone," rather than from more purified preparations such as D.C.A. Dosage may have to be fairly large: amounts such as 10 ml.

of eucortone given intravenously are suggested. When improvement in the patient's condition occurs, repeated injections, perhaps six-hourly or even four-hourly, may be required at first. The duration of the benefit obtained, however, will be the best guide to the frequency of injection.

Summary

Four cases of bilateral suprarenal haemorrhage in association with pregnancy are described.

The pathology, clinical features, and diagnosis of the condition are described and suggestions made for treatment.

Stress is laid on pre-eclamptic toxæmia as an aetiological factor during pregnancy.

The variability of the clinical picture is emphasized. The condition often simulates an acute abdominal catastrophe, and in pregnancy the appearances may suggest an accidental haemorrhage or uterine rupture or inversion.

The diagnosis should be remembered in the rare instances when the expected lesion is not found on examination or at laparotomy, or when the patient is not responding to appropriate conservative treatment.

I should like to express my thanks to Dr. Robert Newton for permission to record these cases and to Dr. E. A. Gerrard for much help in the preparation of this paper.

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The tuberculosis research team of the South Pacific Commission set out for Samoa and Tahiti in April to begin the second stage of a research project which may be the means of saving whole groups of people from extinction. In some areas of the region a high percentage of the population is suffering from tuberculosis. This project is one of many health, economic, and social plans of the Commission (which was established in 1947) for promoting the welfare and advancement of the non-selfgoverning peoples in 15 territories lying south of the Equator. It is an advisory and consultative body which is conducting research into the urgent problems of the region, with a view to making recommendations to the six member Governments—New Zealand, France, Holland, the United Kingdom, and America. After investigating the incidence of tuberculosis the next stage involves prevention and cure; patients must be treated, non-reactors immunized with B.C.G., and adverse factors in food, clothing, housing, and so on that help spread the disease eliminated. In the eastern territories filariasis is a great menace, and in the west malaria; the Commission is trying to find means of dealing with these diseases. A programme of education in removal of possible breeding-grounds of mosquitoes forms part of its plans. In infected areas up to 60% of the population is filarial. The emphasis of control is on preventive measures, and the people are co-operating fully; they are learning to come for blood tests and injections and, when infected, for early treatment. Leprosy, nutritional problems, ophthalmic and venereal diseases are also being investigated in the region.

COMBINED REDUCTIONS OF THE LOWER JAW AND NOSE

BY

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The chief feature of the face is the nose, and the other bony point with which it is in closest relation is the chin. The three cases described below illustrate the profound change in appearance which an alteration in the size-space relationship of these two bony points can produce. In these cases the nose and the jaw have been reduced for the relief of facial ugliness or grotesqueness of congenital origin and of such severity that the appearance has been known to exert a marked and deleterious effect on the life of the patient.

The operations are the reduction of the prognathic jaw by Kostecka's method, and nasal reduction by the standard methods of correction for hooked, bulky, or broken noses. Unlike some facial reconstructions the tissue dissection at these operations is small and the hospital stay a matter of a few days.

Kostecka's Operation

Most prognathic jaws, even those in which the mandibular protrusion in the incisor region exceeds an inch and in which not a single mandibular tooth is in articulation with teeth of the upper jaw, can be brought back into workable occlusion, with the upper incisors in front of the lower incisors, by a bilateral osteotomy of the ascending rami and can be maintained in that position.

Kostecka has devised a neat and simple method of doing this section safely and accurately. The operation is a combined surgical and orthodontic procedure. The lines of bony section above the mandibular foramen and the post-operative occlusion are planned with x-ray pictures and dental models pre-operatively. Before operation cast metal splints are cemented on the teeth, fitted both with hooks for wires (and later elastics) and with screw plates for locking bars. These splints provide the necessary rigid post-operative fixation of the mandible in its new position. A certain amount of grinding of the occlusal surfaces of the cheek teeth to establish a satisfactory functional occlusion is often needed. This can sometimes be done in part before operation from a close study of the models. A final spot-grinding follows operation. Kostecka for this reason uses open cap splints to allow grinding during the period of immobilization.

At operation, stab wounds which heal with virtually invisible scars are used to divide the ascending rami along the predetermined lines by Gigli saws. These saws are placed in position deep to each ascending ramus by the Kostecka seeker. This instrument is shaped like an aneurysm needle and has a finely tempered sharp point in which there is a slot to take the end of a Gigli saw. The seeker is introduced through a stab incision half-way between the tragus and the angle of the jaw and passed down first to the posterior border of the ascending ramus and then, along its deep surface, in the