membrane was pink and bulging. Temperature 102°. Myringotomy produced blood only. Next day the ear was discharging pus freely, but there was still some tenderness.

By the seventh day he was feeling quite well, and free from pain, though the ear was still discharging, and the temperature was not quite down to 98° (see chart). That evening his temperature rose, and was 104° at noon on April 5th. At this point

it remained for three days. The boy was sleeping and eating well; there was no vomiting, no rigor; the only pain was a slight frontal headache; there was no trace of mastoid oedema, but on firm pressure the process was just tender.

A Schwartz mastoid operation showed a cellular bone much engorged, but free from pus except in one or two cells deep below the antrum, and a little purulent fluid in the apical cells. On opening the sinus groove a large offensive abscess was exposed, with the sinus lying in it thrombosed, perforated, and the thrombus beginning to break up. The jugular vein was not tied. Convalescence was normal.

Case 9.

S. B., aged 34, on March 1st, 1929, came complaining of pain in the left ear for one week following influenza. There was no trace of mastoid oedema, but definite tenderness; the tympanic membrane was bulging and a dusky pink. Temperature 98.4°. Myringotomy produced blood only, no pus. During the following days the aural discharge was purulent; definite mastoid tenderness persisted, but without any swelling; there was slight fever. Pain and fever tending to increase, a Schwartz mastoid operation was performed; the bone was very cellular; the cells contained a serous fluid and two small beads of pus only. Complete recovery.

Case 10.

G. R., aged 2, came on March 2nd, 1929, complaining of a swelling above the right ear for one day, but behind that ear for four days. Influenza fourteen days before, but never any aural discharge. Temperature 99.2°. The swelling was tender, but the tympanic membrane appeared absolutely normal. Immediate Schwartz operation revealed a large subperiosteal abscess, chiefly above the ear, and a mastoid process full of thick granulations, all bony trabeculae having disappeared; the lateral sinus was normal; large adenoids were present. Convalescence was uneventful.

Case 11.

J. R., aged 8, came on May 18th, 1929, complaining of intermittent earache on alternate sides during the last week; now absent. Never any aural discharge. The pain came on of itself, when he was quite well. Temperature 100°. Small flat tonsils; large adenoids; nose normal. The left tympanic membrane appeared quite normal, the right was depressed.

The complaint of earache on one side or the other persisted, but no further evidence appeared; there was no trace of mastoid swelling, but slight and variable tenderness over the mastoid antrum; this had possibly been present before he came, as he was sent to me as a case of mastoid disease. On May 22nd I removed tonsils and adenoids, and opened both maxillary antra, which were full of thick muco-pus, later reported streptococcal.

The temperature had never quite settled (see chart), and on the fifth day after operation (May 27th) went to 101.2° in the evening. For the next five days it swung up to this point every evening, and was down every morning. The boy seemed very well; the hearing was normal; there was the same variable, transient,

and quite slight earache and tenderness over the mastoids. On May 31st he was slightly deaf, and complained of bubbling in the ears. There was no oedema, but slight tenderness on the right mastoid; the membrana flaccida of that side appeared red, but the whole drum was retracted. Earache was present only on the left side, where the drum and mastoid seemed normal. I diagnosed a very quiescent mastoiditis, but thought it well to try a paracentesis. On the right side this produced blood, which on culture grew streptococci; on the left there was definite pus, from which

Staphylococcus albus grew. The next day the temperature tended to be lower, and for three days there was no pain. By June 5th, however, the earache had recurred, though it was not severe; there was profuse aural discharge; the evening temperature was 103.2°, and both mastoid processes were slightly tender on firm pressure.

The Schwartz mastoid operation was therefore performed on both sides, with identical findings—a bone cellular, congested, infiltrated with muco-pus; the sinus normal. Convalescence was marked by a bout of fever and thirst—possibly iodoform poisoning—but was otherwise normal; the nose and both ears are now quite dry, and hearing normal. The mastoid infections were streptococcal on both sides. I have no doubt that there was definite mastoid disease at least as early as the day of the paracentesis.

Case 12.

M. B., aged 6, a congenital syphilitic, had had occasional earache, but never discharge; tonsil and adenoid operation in 1927. On May 23rd, 1929, she came complaining of pain in the left ear for four days without preceding illness, and a recent tender post-aural swelling. The tympanic membrane was normal; temperature 99°.

An immediate Schwartz operation showed the mastoid bone congested, but without actual pus. Large adenoids were removed. Two days later she was crying with earache, and a paracentesis was done. A third attack of pain occurred on the tenth day, with a rise of temperature to 103.4°, but this cleared up the next day. On that day haematuria was observed. It is curious that the same sequential haematuria had occurred after the tonsil operation, and in both cases it was suggested that scarlet fever had been "missed." Convalescence was uneventful.

Case 13.

S. N., aged 1, came, on May 25th, 1929, complaining of two days' pain in the left ear, following a cold, and recent post-aural swelling. The swelling was tender and red, but there had never been any aural discharge, and the drum appeared normal. Temperature 102°. An immediate Schwartz mastoid operation showed the whole mastoid and adjacent bone to be congested, dripping blood, but no pus was found. Large adenoids were removed. Convalescence was normal.

Case 14.

C. F., aged 26, came, on May 23rd, 1929, complaining of tinnitus in both ears for two weeks following influenza, without pain. Never any aural discharge or previous ear trouble. At first both ears had been deaf, later only the left. The right tympanic membrane was grey, the left pink, and both indrawn. On inflation air entered both ears with a distinct labial sound, relieving deafness and tinnitus. Three days later he returned with a tender swelling extending from the level of the right mastoid antrum for four inches down the neck, and earache. The drum was neither swollen nor red, but yellow pus could be seen through it. Temperature 101.2°.

A Schwartz mastoid operation showed a typical von Bezold abscess beneath the sterno-mastoid muscle, communicating with the mastoid through a hole in the anterior part of the process; through the latter pus pulsed out. The cortex was somewhat thick, but proved to be a mere shell enclosing a large cavity in which lay the lateral sinus, apparently healthy. Convalescence was normal. The absence of all pain on the first visit caused me to make a diagnosis of catarrhal otitis. I do not believe it possible that in examining the ear either tenderness or oedema was overlooked, but the operation showed that extensive disease of the mastoid must have been already present.

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TWO CASES OF PARAFFINOMA.*

BY

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THIS communication consists of a report of two cases of tumour formation resulting from injection of paraffin or paraffin oil. In both instances the tumours consisted of hyperplasia of connective tissue of dense cicatrizing character, the bulk being further added to by the contained paraffin.

Clinical observation and experimental work with monkeys have demonstrated that mineral oils, when injected into the tissues, may cause foreign body reaction with formation of tumour masses. It is apparent that some individuals are susceptible, and the reaction may be severe, with very extensive mass formation. In other individuals there is no tissue reaction. In some instances the injected paraffin oil has been observed to spread along the lymph channels and

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the lymph nodes, there producing a condition simulating tuberculous adenitis or malignant lymph metastases. Vegetable oils (olive and cotton-seed) do not, experimentally, produce these tissue masses.

CASE I.—*Paraffinoma of the Rectum.*

A married woman, aged 52, was admitted to my private service on July 2nd, 1928, complaining of an increasing difficulty in obtaining evacuation of the bowels, with periods of two to three days' duration of impaction with absolute obstruction. She was referred by two physicians, who in consultation had diagnosed carcinoma of the rectum.

The past history relevant to the existing condition was as follows. In 1920 I had operated for acute cholecystitis; at that time she suffered from prolapsing internal haemorrhoids of sixteen years' duration, radical treatment of which was postponed to a more convenient season. In March, 1927, being in California, she received eight office treatments at weekly intervals. These treatments for the haemorrhoids were under local anaesthesia. She asked but received no information regarding details, but an attendant accompanying her stated that the surgeon appeared to use an apparatus wrapped in a towel from which protruded a nozzle. These treatments promptly caused disappearance of the prolapsing haemorrhoids.

In April, 1928, she returned and had one treatment for a pile which had not completely disappeared. Shortly after this last treatment she noticed an increasing difficulty in satisfactorily emptying the bowel, and from time to time was forced to use oil enemata to gain comfort. Late in June, 1928, an impaction occurred which was unusually resistant to treatment, was associated with distension and vomiting, and was finally relieved by oil followed by soap-suds enemata. She then sought advice.

Digital Examination.—There was first noted an absence of the prolapsing haemorrhoids present in 1920. One and a half inches from the anal orifice the finger encountered a nodular mass, completely encircling the bowel and causing stenosis, which would admit the tip of the finger only. Under anaesthesia the stenosis was dilated and the finger passed through. In vertical diameter the infiltration occupied $2\frac{1}{4}$ inches; the mucosa was smooth, mobile, and nowhere presented ulceration. Extending distally from the constricting ring there were tongue-like processes beneath the mucous membrane.

mucosa. The pathologist's report was inconclusive. Vacuoles were discovered and giant cells, but the pathologist could not be convinced but that he was reporting upon the extremity only of a papilloma and that the section had not passed through the base.

In the meantime the history detailed above had been elicited, and I inferred that the apparatus used by the surgeon was wrapped in a towel because it was hot. The conclusion arrived at was that hard paraffin, melted, had been used as injection to fix the prolapsed haemorrhoids. The diagnosis of paraffinoma was made.

The question of treatment then arose: (1) A disabling stricture was present. (2) The pathologist and consultants were not convinced that in some portion of the mass there might not be a malignant change. (3) A paraffinoma has potential possibilities of developing into carcinoma.

It was decided to do a resection, preserving the lower end of the canal with the sphincters and restoring continuity by rectorrhaphy. This procedure was carried out on July 12th through a modified Kraske incision. The results have been completely satisfactory. Examination one year later demonstrates an active sphincter control, a smooth mucosal surface, and no areas of submucosal infiltration.

CASE II.—*Paraffinoma of Thigh.*

The patient in this case was a woman who, eight years previously, had received three injections of camphor in oil as a cardiac stimulant during a severe illness. At the site of each injection there has gradually and progressively developed a nodule, the removal of the largest of which furnished the section shown in Fig. 4. It has been determined that the camphor was dissolved in a paraffin oil base.

The important deduction from a study of these two cases is the danger of using mineral oil for injection, either as a vehicle for drugs or otherwise.

Notes on paraffinoma appear occasionally in the medical press, in which various opinions are recorded. B. F. Davis,¹ in 1920, reported a case in which apparently solid paraffin was used and not paraffin oil. Oppenheimer,² in 1920, stated that the use of paraffin subcutaneously had decided risk. Morts³ says that paraffin injection is not dangerous if pure grade oil, with melting point of 110° to 115° F., is

FIG. 1.—Photograph of drawing of gross specimen. Note (1) the constriction produced by dense connective tissue, infiltrated and distended by globules of paraffin; (2) absence of ulceration; (3) finger-like processes extending distally from the area of constriction; (4) distance from anal orifice; (5) proximal to the constricting ring there is dilatation of the lumen, also hypertrophy of the muscle layers.

FIG. 2.—Section through margin of tumour. Note (1) the intact mucous membrane; (2) the distortion and fragmentation of the internal muscular coat; (3) the abrupt margin of involvement; (4) the large number of vacuoles, most numerous in the submucosa.

FIG. 3.—Section through submucosa showing amount of contained paraffin as represented by the vacuoles. The connective tissue reaction is well seen in formation of concentric rings about the paraffin mass.

FIG. 4.—Section of a mass removed from the subcutaneous tissue of a woman with paraffinoma of thigh (see Case ii). Note the vacuoles from which paraffin has been dissolved in the process of fixation, also the dense connective tissue. There is also marked lymphocytic infiltration, particularly in spots.

The appearance simulated carcinoma, but had marked points of difference. A stenosing scirrhus cancer is extremely rare in the ampulla, and is not associated with submucous infiltration in long processes with an overlying mobile mucosa. The absence of ulceration eliminated other varieties of carcinoma of the rectum, except the type known as Krukenberg's tumour. A blood Wassermann test proved negative.

A section was removed for biopsy, choosing one of the outlying processes, and removing it entire with the overlying

used. Weidman and Jeffries,⁴ writing in 1923, showed that plain paraffin oil and camphor in paraffin oil were both effective. The oil may remain for eleven months before tumours appear. Monkeys were used in their experiments.

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