STATED MEETING, HELD JUNE 1, 1908.

FIBROLIPOMA OF SYNOVIAL FOLDS OF KNEE-JOINT.

Dr. James K. Young presented a man, 21 years of age, who five years ago sustained an injury to the left knee from a fall on the ice. He exhibited the usual symptoms of synovitis, of which pain was an important and persistent feature, continuing until 18 months ago, when he came under Dr. Young's observation. At this time the knee was partially ankylosed, there was thickening and induration about the patella, with atrophy of the muscles, and pain was excruciating. An exploratory arthrotomy was undertaken to verify the diagnosis of villous arthritis. The incision was a subpatellar one dividing all the structures in the anterior portion of the joint. The condition was found to be a fatty degeneration of the subpatellar bursa and synovial fringes. The recovery was uneventful and the functional use of the joint is perfect.

Dr. Oscar H. Allis said he had had four or five somewhat similar cases, but in these he thought the grade of inflammation was greater than in that of Dr. Young's case, and that that might have possibly been the reason why his results had never been so good. He had gotten fairly good motion, but nothing so complete as in the case presented.

Instead of the incision below, as in Dr. Young's case, which calls for the division of the patella tendon, Dr. Allis prefers an incision above the patella, as he does not think there is quite the same risk with this incision. A good view of the whole joint is obtained by either of these incisions, which are elliptical, turning the patella up in one instance, and down in the other. Dr. T. G. Morton was the first to split the patella longitudinally and turn the lateral halves outward, but with this procedure he did not think one got as good a view of the joint.

TENDON TRANSPLANTATION FOR TALIPES VALGUS.

Dr. Young presented a girl, 12 years of age, who had paralysis of the tibialis anticus muscle with marked valgus, of seven years' duration. For three months prior to the operation the

deformity had been increasing. The operation performed five months ago consisted in the transplantation of the peroneus longus into the tibialis anticus, the valgus having first been restored to normal position. The foot is now in a corrected position and its function normal.

PSOAS ABSCESS CURED BY POSTERIOR OPERATION.

Dr. Young presented a girl, 4½ years old, who was taken ill six months ago with incipient Pott's disease of the lower dorsal vertebræ. There was marked flexion of the thigh and psoas abscess was present. Four months ago the abscess was opened by a posterior incision, the so-called Treves operation. The abscess-cavity was curetted, the extremities of the wound were shortened by sutures, and drainage was maintained for only a very short time, the wound closing in seven weeks. The patient has now entirely recovered from the abscess.

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LUDWIG'S ANGINA.

REPORT OF FIVE CASES INCLUDING ONE AUTOPSY.

BY JOHN W. PRICE, JR., M.D.,

OF LOUISVILLE, KENTUCKY.

In the year of 1836, Dr. Ludwig of Stuttgart, described an acute septic inflammation of the submaxillary region, accompanied by a hard sublingual swelling, together with the symptomatology. This condition has been designated Ludwig's angina. Dr. Thomas has recently collected 106 cases in the literature including two of his own with a mortality of 40.3 per cent. I take this opportunity to express my indebtedness to this comprehensive article by Dr. Thomas for many of the references in my own paper. Probably many cases have occurred which have not been recorded. That it sometimes occurs in groups has been observed by F. Murchison, Klein, Seymour–Taylor and G. G. Davis. The latter says that five of his cases came from the same section of the city in a period of five weeks.

The five cases which I am reporting were admitted to the Episcopal Hospital, Philadelphia, between March 1 and May 12 of this year. Although two of them developed in the same ward of the hospital, I do not regard the condition contagious.

1. *The Infecting Organism.*—No specific organism has been found for Ludwig's angina. Dr. Thomas searched the literature and found eighteen cases reporting the bacteriological findings as follows:

The streptoccus was found alone in six cases. The streptococcus associated with other organisms, staphylococcus and diplococci in eight; the staphylococcus alone in two; the pneumococcus alone in one and an undetermined bacillus in one.

In my cases the following organisms were found:

CASE I.—Cultures and smears show mixed bacteria flora.

CASE II.—Cultures and smears show mixed bacteria flora—Staphylococcus, micrococcus salivarius—Biondi; Streptococcus cappelletti.

CASE III.—Micrococcus salivarius—Biondi.

CASE IV.—Micrococcus salivarius—Biondi.

CASE V.—Cultures from incision show Bact. ferrugineum. (Dyal); by aspiration, large diplococcus, small diplococcus, long, thin bacillus, streptobacillus (strepto-diplo-bacillus?).

2. *The Primary Focus of Infection.*—The most common primary focus of infection is dental caries. Dr. Davis reported one case in which the inflammation was started by a dentist injecting a solution of cocaine around a carious tooth and extracting it. Two of the cases now reported started in this manner. After cocaine had been injected in the gums and the tooth extracted, Case IV developed a submaxillary swelling in 48 hours and Case V developed a submaxillary swelling in 24 hours. Case III had carious teeth and a submaxillary swelling of a month's standing but a sudden enlargement of this swelling developed in four to eight hours after a dentist had pulled a tooth. Other foci that have been mentioned are wounds of the mucous membrane, otitis media, peritonsillar abscess. C. J. Aldrich reports a case that started from the tonsil and W. A. Humphrey describes a case preceded by tonsillitis.

One of the present patients (Case I) had an attack of tonsillitis with a temperature 103 which gradually subsided to normal in five days, but six days later the patient developed Ludwig's angina. Case II complained of sore throat and examination showed redness of the pharynx; the next day the patient had developed Ludwig's angina and in 55 hours he was dead.

3. *The Mode of Transmission of the Infection.*—If the primary focus is in the tooth as in Case III, IV and V, I agree with Dr. Davis that the inflammation involves the periosteum of the lower jaw and thence invades all the surrounding tissues by direct contiguity. But if the primary focus is the pharynx (Case II) or the tonsil (Case I) or some other point distant

from the submaxillary region, it is probable that the infection was carried by the lymphatics. It is possible there is transmission of the infection from the mouth by the ducts of the sublingual gland which show marked inflammatory cellulitis in the sections from Case II.

Regardless of the seat of the primary focus, the secondary infection in these cases is in the submaxillary region; the floor of the mouth; and the following muscles: digastric, stylohyoid, mylohyoid, geniohyoid, geniohyoglossus hyoglossus, chondroglossus, styloglossus, palatoglossus, sternohyoid, sternothyroid, thyrohyoid, omohyoid.

The connecting tissues and overlying subcutaneous tissue are also affected. The pharynx and larynx become rapidly involved. In a fatal case, as in Case II, the entire trachea may be invaded. The cellular infiltration travels by the lymphatic spaces and by contiguity.

The clinical picture of the condition given by Ludwig was that of a fatal case.

The following are the symptoms of the early and less severe types:

Constitutional.—There is early fever, temperature 99 to 103, headache, malaise, loss of appetite and insomnia.

Local.—Increase in the secretion of saliva which is of a thick ropy character. If there is an opening into the mouth there is a profuse mucopurulent discharge together with the saliva which may amount to as much as sixteen ounces in twenty-four hours. Soon the patient notices a submaxillary swelling of a shoe-leather resistance which is painful. There is also tenderness which may be marked or slight. Then there is rapid œdema of the sublingual tissues and swelling of the face as far up as the malar bone and swelling of the neck down to the clavicle. The larynx and pharynx are rapidly affected and there is difficulty in opening the mouth, in swallowing, talking and breathing.

Treatment.—As soon as the diagnosis is made, use local anæsthesia (ethyl chloride) and make incisions over the submaxillary triangles through the mylohyoid muscles and if

there is severe swelling also through the median line between the hyoid bone and the symphysis to the mucous membrane. Use rubber drainage-tubes through and through the lateral incisions.

If the sublingual tissue is markedly œdematous, incise the mucous membrane from the midline to the second molar tooth and then insert a curette and curette wherever there is a feeling of the tissues giving way. There is usually a profuse discharge of blood which clots immediately. There will then be a profuse mucopurulent discharge of a very foul odor and bad taste. The relief is instant. You can actually see the sublingual œdema subside, and the patient will tell you that he can talk better and you will be able to notice the change in the voice.

Prognosis.—Dr. G. G. Davis reports mortality 40 per cent. in the cases under his own care. Thomas in his recent paper gives the mortality as 40.3 per cent. for all the cases reported.

Of the five cases now reported, one died and four recovered—mortality 20 per cent. The first of these patients was admitted to the Episcopal Hospital in the service of Dr. William T. Van Pelt and the other four in the service of Dr. Thomas R. Neilson with whose kind permission they are presented.

Case I.—(Surgeon, Dr. William T. Van Pelt). J. T., age 29 years. Admitted December 24, 1907; suffering from interstitial keratitis. February 13, 1908, complained of sore throat, headache, backache and loss of appetite. 5.30 P.M. Examination: throat, pharynx and tonsils are red. 11.50 P.M., tonsils are slightly swollen and show a few follicles filled with pus. Treatment: H_2O_2 and $AgNO_3$ gr. lx to ℥i.

2–20–'08. Less pain in the throat. Tonsils are swollen and some crypts contain pus. Anterior cervical glands are enlarged.

2–23–'08. Very few crypts contain pus. Has no pain. Feels well. Temperature 98°.

2–29–'08, 9 A.M. Has complained all night of not sleeping and of pain in the throat. Difficulty in swallowing. Examina-

tions show tonsils red and anterior cervical glands are enlarged and painful.

3–1–'08, 12.15 A.M. Complains of pain and swelling of floor of mouth and difficulty in talking and drinking. Cannot take food. Examination shows marked cellulitis of neck and the submaxillary region is very painful and tender to touch. Very hard. Difficulty in moving tongue and opening mouth. Marked œdema of floor of mouth and mucous membrane. Tongue is swollen. Increased saliva. Condition resembles Ludwig's angina.

Operation by Dr. Price:—Local anæsthesia—ethyl chloride. Three incisions are made. One in the median line below the chin and two lateral incisions into the submaxillary triangle. Blood and serum flowed freely. Subcutaneous tissue œdematous. A rubber drainage-tube is passed through and through the lateral incisions. Patient says he feels much better.

3–1–'08. P.M. Patient is doing nicely. Not so much submaxillary swelling.

3–2–'08 (1st day after operation). Dr. Davis examined patient and considered it Ludwig's angina. Dr. Davis passed a knife by median incision, through the floor of the mouth. Incisions are draining blood and serum. Patient feels better. He can get his mouth open more easily. Tongue is only slightly swollen.

3–3–'08 (2nd day). General condition is very much better. Not so much swelling. Patient is expectorating a foul, bloody mucopurulent sputum. The pharynx is not so congested. Incisions are draining bloody serum—no pus. *Tube removed.* Iodoform gauze inserted.

3–4–'08 (3rd day). Says he feels quite well. Tongue is normal. The lymphatics are markedly improved; only slightly enlarged. Feels like eating. Incisions are draining very little.

3–5–'08 (4th day). Doing splendidly. All symptoms have subsided. Temperature normal, 98.2°. The cornea is also much clearer than it has been.

3–15–'08. The incisions are granulating. Cultures and smears showed mixed bacteria flora.

4–8–'08. Discharged. The cornea is still cloudy and conjunctiva is slightly congested. Has no pain. Vision is fair.

CASE II.—(Surgeon, Dr. Neilson). W. T., age 80 years. Diagnosis: On admission, leg ulcer. Revised, complications, œdema of larynx, nephritis, myocarditis, arteriosclerosis, submaxillary adenitis, Ludwig's angina. Result: Died.

December 30, 1907. Patient was admitted to hospital for leg ulcer, size of silver dollar.

April 4, 1908. Complained of sore throat. Examinations showed redness of pharynx, especially on left side. Teeth are mostly missing, but there are several stumps or snags in bad condition.

On the next day there was difficulty in speaking. Examination showed œdema of sublingual tissue and slight cellulitis of submental region and submaxillary regions, especially the left.

Operation by Dr. Price: Multiple incisions made in mucous membrane beneath the sides of the tongue. Local condition not relieved.

By the following day, 8 P.M., sublingeal œdema increased and patient does not talk so well. Has difficulty in breathing and swallowing and does not take food. An incision is made in the mucous membrane for one inch parallel to the alveolar margin along the base of the tongue on both sides. An incision is made in the median line into the sublingual tissue. These incisions seemed to relieve the patient at once of some of the œdema. He said he felt better and could talk more distinctly.

4–7–'08 (2nd day). Patient died at 6.45 A.M. It is said by the nurse that just before death he was talking to a patient in the next bed and that suddenly he fell over dead.

AUTOPSY.

Tongue.—Tissues of the mouth beneath the tongue seem to be swollen and œdematous; posterior part of the tongue is slightly swollen. Both tonsils are greatly enlarged, swollen, and on section in places show oozing of a small amount of thick creamy pus.

Pharynx.—Epiglottis greatly swollen and congested, reaching in places nearly half an inch in thickness. The larynx in the region of the vocal cords is greatly swollen and congested and œdematous, showing acute inflammatory œdema. The left side of the epiglottis and the larynx seem swollen more than the right.

Cultures were made from the larynx, from the tissues in the immediate vicinity of the larynx, and from the base of the tongue.

Smears from these regions were also made. The streptococcus capelletti and the *micrococcus salivarius—Biondi* were found.

Trachea.—Showed marked swelling of the mucous membrane covered with a fibrinous mucopurulent exudate throughout.

MICROSCOPICAL SECTIONS

1. *Tonsil.*—Shows marked congestion, vessels are markedly dilated and filled with blood; the crypts are filled with plugs of granular debris containing bacteria. The peritonsillar tissue shows marked congestion and marked œdema and the perivascular spaces show large collections of leucocytes.

2. *Epiglottis.*—Section shows epithelial surfaces everywhere covered with much mucus, epithelial cells and leucocytes. Below epithelium the tissue is everywhere infiltrated with leucocytes, red corpuscles and inflammatory œdema. In some areas these collections of leucocytes, especially around the vessels, form distinct round abscesses. The vessels are everywhere markedly congested. This inflammatory œdema and exudation extends down to the cartilage.

Base of Tongue and Sublingual Gland.—The sublingual gland shows marked inflammatory cellulitis. The stroma is markedly infiltrated with leucocytes. These cellular infiltrations are so great that they press on the glandular tissue in many places to such an extent that the normal shape is lost. The tissues surrounding the gland contain considerable fat markedly infiltrated with large areas of leucocytic collections. These collections of leucocytes are so great that they form small pockets of pus.

The inflammatory infiltrations *i. e.,* the leucocytic collections continue to the underlying muscular tissue and infiltrate the muscle fibres, separating them from one another. The intermuscular tissue in this area also shows considerable œdema and in some places there are to be seen small hemorrhages. All of the blood-vessels are congested.

Base of Tongue and Submaxillary Gland.—The submaxillary gland is apparently normal. The borders show slight inflammatory œdema and collections of leucocytes. The remainder of the section shows a similar condition described in section 3, *i. e.,* inflammatory exudate, œdema, hemorrhages and pus. Sections 5 and 6 also taken from the base of the tongue at different points show the same conditions. These six sections have also been stained to show the presence of bacteria. In the infiltrated areas there are moderately large micrococcus; a small diplococcus; a small diplococcus in chains. The study of sections with the microscope seems to show that the cellular infiltration has travelled by the lymphatic spaces and by contiguity.

Diagnosis.—Acute œdema of larynx secondary to a phlegmonous condition of the soft parts surrounding; marked interstitial nephritis; marked myocarditis with calcification of the larger vessels and sclerosis of the mitral and aortic valves and coronary vessels; old tuberculosis of the apices of both lungs; atrophy of liver with fatty change.

CASE III.—(Surgeon, Dr. Neilson). T. C., age 29 years. Diagnosis: On admission, submaxillary adenitis and sublingual cellulitis. Revised, Ludwig's angina. Result: Recovered.

Was admitted to hospital April 21, 1908.

Present Illness.—Began one month ago with a swelling beneath the right inferior maxilla. This was painless and hard and of very moderate size. For past three weeks he has had neuralgia of left upper part of face. One week ago he had the left canine tooth pulled. This relieved his neuralgia. A few hours later the submaxillary swelling had increased. Upon the following day he noticed sublingual œdema of right side only and swelling of right side of his tongue. This swelling rapidly increased so that on the morning of April 17, 1908, the tongue filled the posterior part of his mouth, touching the palate. On the left side of the tongue there was a small air-passage. He could breathe freely by the nose. Pain was due to pressure of tongue on the teeth. Speech was interfered with on account of inability to move his tongue freely. Says he was not hoarse. His breath was very foul. Saliva was increased to an enormous degree and was sticky and thick. Appetite was poor. He was able to swallow "milk and raw eggs," says that he would get this mixture in the anterior part of his mouth and then close the mouth and push the tongue forward like a wedge and thus force the mixture into the throat and swallow it. Temperature was not taken before 4–18–'08, and he does not know the degree. He slept in a sitting posture and the saliva would run from his mouth. His attending physician cut into the sublingual tissue but found only blood.

When admitted to hospital, April 21, his temperature was 100°; pulse, 72; respiration, 24. Fairly well nourished man who appears to be under tone. Face is drawn and cheeks are hollow. Pupils react. Tongue is coated gray throughout. It is swollen, especially on the right side, and posteriorly it touched the roof of the mouth. Speech is thick. Sublingual tissues are moderately œdematous on the right side only from the midline posteriorly and are higher than the cutting edges of the teeth. A small gray membrane to the right of the midline of the sublingual tissues marks the point of the attending physician's incision. Right first molar is carious and other teeth contain cavities. In the right submaxillary region there is a hard swelling slightly

nodular extending from the midline to the angle of the jaw. This swelling is not very prominent. Heart and lungs are normal.

11.30 A.M. He says that he expectorated three large masses of yellow-greenish mucopurulent material of very bad odor and taste one after another. These seemed to come from behind his tongue. He began to rapidly improve. Swelling of tongue decreased and he is able to speak more clearly.

3.30 P.M. Examination shows no discharging point, although the sputum cup is full of mucopurulent material and thin watery matter. This has a bad rotten taste.

5.30 P.M. Operation by Dr. Price: sublingual tissue is still œdematous and an incision is made into it, starting at the midline and going back to the last molar tooth. A curette is inserted (1½ in.) and used thoroughly. A great deal of blood that clots instantly is removed, also small bits of caseous material—possibly glandular. A small amount of light greenish mucopurulent material is seen. This seemed to come from near the midline. The curretting caused little pain. Pressure on the outside did not increase the flow. Cultures from incision showed "*micrococcus salivarius—Biondi.*" *

During the day thereafter, sublingual œdema and swelling of tongue became very much less. General condition very satisfactory.

By the third day the tongue was normal. Sublingual œdema slight.

Steady improvement thereafter; patient was discharged on the ninth day.

CASE IV.—(Surgeon, Dr. Neilson). J. D., age 22. April 24, 1908, a dentist injected cocaine around the first right molar in the lower jaw and extracted the tooth. Two days later he noticed a very hard painful swelling below the right inferior maxilla; began to lose his appetite, had slight headache and malaise, causing him to stop work after five days. May 1, he had difficulty in talking and swallowing, his voice was husky.

* M. salivarius—Biondi.—Morphology, cocci round slightly oval, stain by Gram's method; gelatin colonies, surface: round, grayish-white, which may become darker; gelatin stab, in depth beaded, white; potato: growth scanty; pathogenesis, innoculations of mice, guinea pigs and rabbits cause death in four to six days, cocci in organs, no inflammatory reaction in tissues; habitat, saliva of man.

After another day he had difficulty in breathing. May 3, he came to the hospital surgical dispensary when sublingual œdema was observed by Dr. Ivy. Then patient refused to remain in the hospital. The swelling continued to increase in size until 8 P.M. He had dull pain through his neck and cough and increased saliva. By the next day he had such difficulty in opening his mouth that he said he thought he was getting lockjaw and came to the hospital. He has been unable to sleep. He was finally received at the hospital May 4, 1908. He walked to the hospital. When admitted his temperature was 99.2°. Pulse, 92. Respiration, 26. Blood: leucocytosis, 12,200. The right cheek is swollen. There is a hard firm swelling the size of a half egg in the right submaxillary region. The submental region is also swollen from the symphysis to the hyoid bone and extends two fingers to the left of the median line. The sublingual tissue on the right side is markedly œdematous, being above the cutting edges of the teeth and pushes the tongue upward. On the left side it is only slightly œdematous. The tongue is covered with a gray pia. It is not swollen but it cannot be protruded beyond the lips. The face is flushed and the pupils dilated. Chest: lungs; left-apex resonance is impaired. The breath sounds are harsh. Remainder of lungs are clear. Heart: muscular tone is good. No murmurs. Abdomen is normal.

2.45 P.M. Operation by Dr. Price: One incision is made in the median line from without inward through the floor of the mouth. A second incision is made over the right submaxillary triangle through the mylohyoid muscle. A hæmostat is passed in beneath the mylohyoid from the lateral incision to the median incision and a rubber drainage-tube is inserted through and through. A third incision is made in the right sublingual tissue and a curette inserted. Nothing but blood and bloody serum removed. The blood clots instantly. No pus found. Wet dressing applied. Alcohol 65 per cent. Bichloride of mercury 1–4000 ää. Patient says that he feels much relief. Says that he can talk better.

7 P.M. Patient is expectorating large amounts of saliva and blood and blood-clots.

5–5–'08. Had only few short naps during the night.

(1st day.) Says he feels much better than before the incisions were made. Has less difficulty in swallowing and talking.

His voice is still husky. He still has pain on swallowing. No headache. No appetite. No shortness of breath. This A.M. his expectoration consists of a thick ropy mucopurulent material. Redressed. Discharge is bloody. Small amount of pus about the ends of the rubber tube. The sublingual and submaxillary swellings are about the same as yesterday.

(2nd day.) Examination shows increased sublingual swelling on the left side. Sublingual tissues extend above the level of the edges of the teeth. The submaxillary swelling on the left side has increased and is very hard. The left cheek is swollen. (Right side.) The submaxillary and sublingual swellings have markedly decreased and the submaxillary region is not so hard. Right cheek is still slightly swollen.

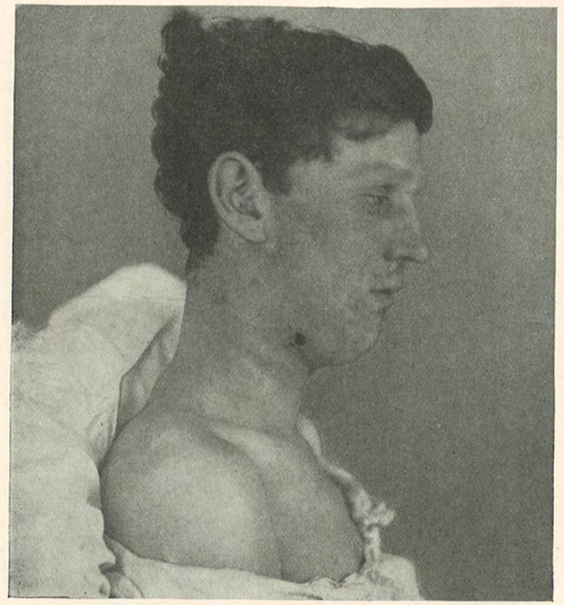
Second operation by Dr. Price: An incision one inch long, parallel to the inferior maxilla over the left submaxillary triangle, is made through the skin and mylohyoid muscle. A hæmostat is inserted and opened in all directions. To the left of the median line, one-half dram of pus is found. One or two large gas-bubbles are seen to come out with the pus. Cultures are made. The median incision is enlarged and a rubber drainage-tube is inserted through and through from the median line to the left lateral incision beneath the mylohyoid muscle. Original tube is removed and a fresh one is inserted in the region of the lateral incision. Wet dressings: Alcohol 65 per cent. Bichloride mercury, 1–4000 ää applied. (5 P.M.) Blood: Leucocytosis, 13,800. (6 P.M.) General condition is much better.

(3rd day.) Feels stronger. Sputum is foul and bad-tasting. He expectorates about two cupfuls each day, and each night. Examination shows all swellings much less than this A.M. Sublingual tissues especially appear almost normal. Swelling of right cheek has disappeared and swelling of left cheek is slight.

(4th day, 5–8–'08.) Blood leucocytosis, 8160. Slept almost the entire night. Expectoration for the night is one cupful. Appetite is better. Temperature, 98°.

Examination.—Swelling of left cheek has disappeared. Submaxillary and submental swellings are slight. Sublingual tissue appears about normal. Discharge is less and very foul. Steady improvement from this date and he was discharged from hospital well on tenth day.

FIG. 1.

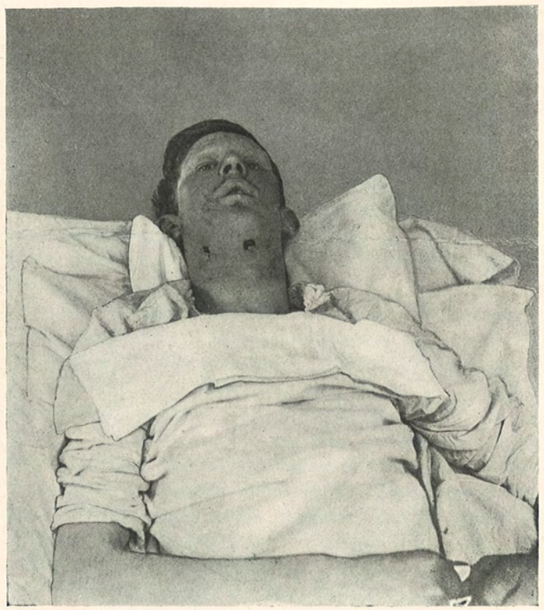


CASE IV.—J. D Showing the swelling in the submaxillary and submental regions, also the incision and drainage tube into the submaxillary triangle.

FIG. 2.

CASE IV.—J. D. Showing the drainage tube passing from the incision in the submaxillary triangle to the median incision in the submental region.

FIG. 3.



CASE IV.—J. D. Showing swellings of the right cheek, submaxillary and submental regions.

Cultures from incisions showed *micrococcus salivarius—Biondi.*

CASE V.—(Surgeon, Dr. Neilson.) C. B., female, age 16 years. May 1, 1908, patient had the first right molar extracted. May 8 she had cocaine injected around the second right molar and the tooth was extracted. On the following day she noticed a submaxillary swelling that was very hard and painful. Two days later she noticed sublingual œdema, also a hard swelling in the submental region. She complained of difficulty in swallowing and was able to sleep only three hours during the night. The sublingual œdema increased and the swelling below the jaw became larger and more painful and tender. Also difficulty in swallowing. Difficulty in talking. Her voice is husky. Difficulty in opening her mouth. Loss of appetite, headache and malaise. Breathing is not affected. Increased saliva that is thick and ropy. Applied for admission to hospital on the twelfth of May.

Physical Examination.—Well-nourished girl. Mouth: numerous carious teeth. The first and second molars are missing on the right side. The gums at this point is covered with a thin grayish-yellow slough. The sublingual tissues on the right side are œdematous but do not quite reach a level with the cutting edges of the teeth; on the left side they are slightly œdematous. There is a swelling of the right side of the face and neck extending from the malar bone to the sternum. The swelling over the submaxillary triangle and the submental region as far as the hyoid bone is very hard and of a shoe-leather resistance. There is no fluctuation. The anterior cervical lymphatics are palpable as a small chain of beads on the right side only. The thyroid gland seems slightly enlarged. W. B. C., 20,440.

Operation by Dr. Price immediately after admission. Local anæsthesia with ethyl chloride. Two incisions are made. One over each submaxillary triangle, parallel with the jaw and about one inch long. The incisions passed through the mylohyoid muscle. There was a free flow of blood and serum. Nothing that could be considered pus was seen. The subcutaneous tissues were quite œdematous. A hæmostat was inserted and opened in all directions and passed beneath the mylohyoid muscle from one incision to the other. A rubber drainage-tube was inserted through and through. Immediately relief followed the operation.

The following day the submaxillary and sublingual swellings were decreased. In the submental region the tissues were still quite hard. The swelling from the hyoid bone to the sternum had entirely disappeared. Patient much more comfortable. She expectorates a thick ropy white sputum profusely. Breath is foul.

Gradual subsidence of all symptoms, resulting in full recovery and discharged well on the eleventh day.

Cultures from incision showed Bact. ferrugineum (Dyal) and from aspirated material showed: large diplococcus, small diplococcus, long, thin bacillus, shorter, thicker bacillus, streptobacillus (strepto-diplo-bacillus?).

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Dr. T. Turner Thomas (by invitation) in discussing this paper said he believed that Ludwig's angina was more common than is generally supposed, but that these five cases occurring in one hospital within ten weeks made it appear more common than even he had believed. He thinks there is no doubt regarding the diagnosis in any of Dr. Price's cases. In many cases, however, he says there is much confusion in the diagnosis, many being reported as Ludwig's angina which were simply cases of submaxillary cellulitis, because the patient could not open the mouth, had difficulty in swallowing, in speaking, and in handling the saliva. In every one of Dr. Price's cases he thinks there are typical symptoms of the condition as described by Ludwig, which began in the submaxillary region, with possibly the exception of the second case, which began in the mouth and is of a different and more dangerous type. It is worthy of note that this was the only case which died.

Dr. Thomas considers that the danger in this condition is in the invasion of the larynx, and is particularly present when the floor of the mouth becomes involved because the tissue in the floor of the mouth is loose and contiguous with the submucous tissue of the pharynx and larynx, so that when this tissue is once involved it takes but a short time before the larynx is infected. Therefore, any infection of this character beginning in this region is a very dangerous condition, and the more dangerous, usually, the nearer its origin is to the larynx. Take, for instance, the cases reported by Semon; these were of the kind which begin in the region of the tonsil or in the neighborhood of the larynx itself, and in these cases the mortality was very high. A large number of them developed trouble also in the lungs or pleura.

Dr. Thomas considers that the most important point in the treatment of cases of Ludwig's angina is to recognize the focus from which the process is spreading and attack that. He does not believe the tonsillitis, the carious teeth, or the little ulcer in the mouth is the essential focus in the majority of cases. In one case reported in the literature the mouth became dangerously infected from a wound inflicted by the kick of a horse, knocking out several teeth; and lacerating the floor of the mouth. In one of his own cases the trouble began in the floor of the mouth from a gunshot-fracture of the jaw. He believes the great majority of cases begin in the submaxillary region, and that this is due to the fact that the infection enters the system by the way of a slight focus somewhere in the mouth, and from there extends to the lymphatic glands in the submaxillary region, where the infection becomes more active and causes rapid and great trouble; that is the real focus of origin.

Dr. Thomas does not believe much in the importance of the deep fascia of the submaxillary region as a restraining structure. He has dissected rather a large number of necks, and after taking away the platysma myoides muscle he believes what fascia is left is very delicate and cannot be an important structure in holding the swelling down.

Dr. G. G. Davis said that the bacteriological examinations in Dr. Price's cases, as in practically all of the other cases reported, showed the character of the infection to be of varying type. His paper also shows that the point of infection is not the same in every case. It is interesting that in two or three of the cases the

teeth proved to be the infecting point, and the question suggests itself, was it the injection of the cocaine by the dentist, or was it the pulling of the teeth which caused the inflammation to start up? In a case which Dr. Davis reported a lawsuit was threatened to prosecute the dentist for introducing the infection, whereas it is very well known that dentists, as a rule, object very seriously to pulling teeth or doing any operative procedures on the mouth when there is a marked inflammation of the structures.

Mention was made by Dr. Price of the lymphatics, and Dr. Thomas likewise referred to the lmphatics carrying the infection from the centre or interior of the mouth to the outside of the jaw in the submaxillary region. Dr. Davis has never thought that the infection was transmitted primarily by the lymphatics. However, in one of his cases Dr. Price mentioned that some of the lymphatics were involved. This is the first case in which Dr. Davis has ever heard of involvement of the lymphatics, as such, being recognized. In other words, although we have lymphatics in profusion along the deep vessels of the neck, yet we do not find isolated enlargement of lymphatic nodes, but we do find inflammation spreading along the cellular tissue.

Dr. Davis thought particular attention should be called to the treatment in the cases reported. He thinks their prompt recovery was due to the vigorous treatment which they received. The appearance of a patient with this condition is really alarming, and when these cases fall into the hands of general practitioners who are not proficient in severe surgical procedures, they are afraid to make such incisions as are demanded in such cases. The extent of the incisions demanded was well shown in some of Dr. Price's cases, in which he made an incision into the mouth from the outside in the median line, and likewise incisions on both sides in the submaxillary region.

THE CONSERVATIVE TREATMENT OF FRACTURES OF THE FEMUR.

NOTE ON THE END-RESULTS OF SIXTY-ONE FRACTURES OF THE FEMUR CONSERVATIVELY TREATED.

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THERE is at present a manifest tendency towards the operative treatment of recent fractures of the long bones, even when the fractures are not compound. Fractures of the femur, which are generally recognized as the most serious of all such fractures in regard both to their immediate mortality and their ultimate results, appear to offer no exception to this modern tendency, which some surgeons would even dignify by erecting into a rule of practice. It seems incumbent, however, on those who thus seek to alter the traditions of surgery, either to demonstrate the evil results which they regard as a necessary consequence of accepted methods, or to bring forward proof that by operation still better results can be obtained, and without unjustifiable risk to the patient. The advocates of operative treatment, in short, should either be able to show that the methods they propose will not increase the immediate mortality, and will greatly diminish or altogether prevent the unfavorable results of conservative treatment; or, failing this, they should at least convince conservative surgeons that the functional results of the accepted forms of treatment are such as can no longer be tolerated.

Sir Thomas Myles (Med. Press and Circular, 1907, lxxxiv, 35), speaking recently of fractures of the femur, said:

"My own experience of the result of routine treatment in these cases is not very encouraging. I have found that in nearly all cases occurring in adults there has been considerable shortening and consequent lameness, some stiffness in the knee-joint, some limitation of the movements of rotation at the hip-joint, a varying degree of muscular atrophy, pain with changes in the weather, and almost always an ugly knob of callus to be felt or seen at the seat of the united fracture. . . . At first I felt inclined to blame myself for these results, but further study of the subject soon taught me that they are the invariable and inevitable results of the methods of treatment usually adopted." He adds that it has hitherto been an accepted fact "that shortening of an inch or two is the inevitable outcome of such injuries, and that nothing can be done to prevent it." In support of these positive assertions he calls to witness museum specimens and skiagraphs; but in regard to such testimony we think it should be borne in mind that the former are selected as curios, and hence the chief desideratum is the presence of deformity and exuberant callus; while skiagraphs are notorious for exaggerating any deformity which may exist. Moreover, Myles presents no details of the end-results of the operative treatment which he so vehemently urges.

Among other surgeons who are champions of the operative treatment of recent fractures may be mentioned Lane and Knaggs, in England, and Vaughan and Martin, in this country.

König (Arch. f. klin. Chir., 1907, lxxxiii, 1032) favors operative treatment for recent fractures of the cervix, the trochanters, and for supracondylar fractures; fractures of the shaft he thinks may give quite satisfactory results under conservative treatment.

Bardenheuer (Die allgemeine Lehre von den Fracturen u. Luxationen, Stuttgart, 1907, 304), on the other hand, does not favor operative treatment at all; he calls attention to the fact that in spite of the advances in aseptic technique Tuffier among 22 such operations had 3 to suppurate.

The end-results under conservative treatment have not received much attention, with the exception of those of the neck of the femur; most surgeons are content with the "general impression" they have received from the results of the cases under their treatment. In fractures of the cervix femoris the prognosis as to ultimate function has generally been regarded as gloomy; but Mr. Bryant (cited by Stimson: Fractures and Dislocations, New York and Philadelphia, 1899, 326) was much more optimistic as to these patients than most surgeons; on more than one occasion he said that all his hospital cases of fracture of the cervix for many years (42 cases, average age 70 years) "went out with good and useful limbs"; a statement, which, as Stimson remarks, indicates much better results than have been reported elsewhere, even if the standard of "good and useful" is only that the patient can stand and walk a little with the aid of a cane. But it may be recalled that Dr. Le Conte, before the Philadelphia Academy of Surgery (ANNALS OF SURGERY, 1905, ii, 284), stated his impression that 80 per cent. of his patients with intracapsular fracture were discharged "with useful and valuable legs."

Scudder (Treatment of Fractures, Philadelphia, 1907, 6th ed., 336) reports the end-results of 16 fractures of the neck of the femur treated at the Massachusetts General Hospital. Only three of these patients were over 60 years of age at the time of the accident. Only two patients had functionally useful limbs, while thirteen had to use a crutch, a cane, or had disability in going up and down stairs. J. B. Walker (ANNALS OF SURGERY, 1908, i, 84) has recently published an investigation of 112 cases of fracture of the neck of the femur treated at the Bellevue Hospital, New York. There were 18 deaths, an immediate mortality of 16 per cent. (a number of patients, also, were transferred in a few days to other institutions; if these were included the mortality would probably be higher); 10 patients were still under treatment in the wards; 32 could not be traced; and of the 52 patients who were traced, no less than 30 (57.6 per cent.) were found

to be incapacitated, 12 were still compelled to use a cane, and only 10 (less than one out of five) could do their normal work.

Certainly there is a marked divergence between the results reported by Scudder and by Walker, and those observed by Bryant and by Le Conte.

As a contribution to this subject we have studied 121 recent fractures of the femur which have been under treatment in the Episcopal Hospital during the last three years; and we take this opportunity to acknowledge the courtesy of the staff in permitting us to examine their case-records and their patients. Although there have also been admitted during this time a few patients with ununited fractures of the femoral neck, these have not been included in our statistics, as the object was merely to ascertain the end-results of conservative treatment of recent fractures.

The following classification has been adopted:

Region of Femur Involved.	Condition on Discharge.
Cervix, 58 cases	Cured, 20 patients; improved, 20 patients; not improved, 2 patients, died, 16 patients.
Trochanteric, 13 cases	Cured, 12 patients; improved, 1 patient; died, 0 patient.
Shaft, 32 cases	Cured, 26 patients; improved, 1 patient; died, 5 patients.
Condyles, 18 cases	Cured, 15 patients; improved, 2 patients; died, 1 patient.

There has been no distinction made in our figures between intra- and extracapsular fractures of the neck of the thigh-bone. It is distinctly stated in only two cases that the fracture (cervix) was still ununited on discharge; but it is possible that no union was present in 8 other patients. It is reasonably certain, however, that firm union (probably not bony in all cases) was secured in 29 patients (69 per cent. of those who recovered). We have classed as trochanteric both fractures

"through the trochanters" and "subtrochanteric" fractures; and among fractures of the condyles are included, besides 15 typical "supracondylar" fractures, also 2 cases of fracture through the external condyle, and 1 case of compound epiphyseal separation, all three of the last-named fractures involving the knee-joint.

The mortality among these 121 cases was 18.1 per cent.

CAUSES OF DEATH.

The causes of death may be seen in the following table:

Cervix, 16 deaths, mortality 27.6 per cent.: shock, 2 patients; pneumonia, 3; decubitus, 3; exhaustion, 5; uræmia, 1; cancer of the pylorus, 1; enlargement of prostate, 1. (Age varied from 59 to 84 years, 11 patients being over 70 years; and the period until death varying from 1 day to 10 months).

Trochanteric, no deaths.

Shaft, 5 deaths, mortality 15.6 per cent.: other injuries, 3 patients, aged 76, 51, and 60 years; delirium tremens, 1, aged 33 years; pneumonia, 1, aged 71 years, after five days.

Condyles, 1 death, mortality 5.5 per cent.: œdema of lungs, 1 patient, aged 66 years.

With the exception of the fractures of the neck of the femur there was only one fracture in which on discharge firm bony union had not taken place. This patient, a woman aged 65 years, with a fracture at the junction of the middle and lower thirds of the shaft, went home over ten weeks after admission, wearing a plaster cast, with fibrous union. It has been impossible to trace her since her discharge more than two years ago. Several skiagraphs made while she was under treatment showed good apposition of a nearly transverse fracture.

The treatment adopted has been so various as to be fully representative. While all the surgeons employ longitudinal traction by means of Buck's extension apparatus, some use only sandbags in addition; others will have none of sandbags, but employ Volkmann's sliding splint; and some are partial to the double inclined plane, Smith's anterior splint, and

other more complicated appliances. A number of the fractures of the neck of the femur have been treated with encouraging results by both longitudinal and lateral traction, as advocated in 1869 by Phillips (Amer. Jour. Med. Sciences, 1869, lviii, 398), and as recently popularized by Maxwell, Ruth, and others.

The ages of these patients varied from 4 months to 86 years.

Notices were sent to all of the 99 patients who recovered. Of these, 29 returned to the hospital for examination; 17 were examined at their homes; and accurate accounts of the present condition of 15 were received from their family or friends. It was impossible to trace 37 patients. There are thus available for our report 61 patients showing the end-results of treatment.

Contrary to our expectation, the ultimate results in those patients who did not return for examination were as good as, and in some instances better than, those in the patients who came to the hospital. Thus one old lady of nearly 70 years, with fracture of the neck of the femur, was found busy housecleaning, having just moved all her parlor furniture into the front hall and vestibule. Other patients were visited at their places of employment, and were found too hard at work to spare the time to return to the hospital for examination.

We have classed the functional end-results under the following headings: (1) Perfect functional result, which, without regard to shortening, implies the entire absence of limp, and of any hindrance to the normal use of the limb. It should be stated, however, that none of these patients were acrobats, either before or after their injury. (2) No disability but limp. (3) Marked impairment of function, which implies that the limp was decided, and that in some cases the use of a cane, and in a few the use of a crutch, was still necessary, although even these patients were by no means helpless. Thus one patient (cervix), included in this class of "marked impairment of function," uses a crutch on the street, a cane at home, goes up and down stairs constantly, and supports herself by the

use of a sewing machine, which she runs with either foot indifferently. (4) Incapacitated, which implies that the patient has to use two crutches, or is confined to the house.

The end-results of the 61 cases may be thus tabulated:

END-RESULTS OF SIXTY-ONE CASES OF FRACTURE OF THE FEMUR TREATED CONSERVATIVELY.

Site of Fracture.	Cases Treated.	Cases Recovered.	Cases Traced.	I. Perfect Functional Result.	II. No Disability but Limp.	III. Marked Impairment of Function.	IV. Incapacitated.
Cervix	58	42	21	5	8	6	2
Trochanteric	13	13	9	5	2	2	0
Shaft	32	27	22	14	8	0	0
Condyles	18	17	9	4	3	0	2
Total	121	99	61	28	21	8	4

Forty-one patients were examined for shortening; the results are shown in the accompanying table:

SHORTENING.

Site of Fracture.	No. of Patients Measured.	No Shortening.	Shortening less than				
			1 cm.	2 cm.	2.5 cm.	4 cm.	5 cm.
Cervix	12	1	3	3	2	2	1
Trochanters	6	1	2	.	1	.	2
Shaft	17	5	8	4	.	.	.
Condyles	6	1	.	1	.	3	1
Total	41	8	13	8	3	5	4

Among 41 patients measured, 8, or about one-fifth, recovered without shortening; 32, or 78 per cent., had less than one inch shortening; none of the patients had more than two inches shortening; and none of the patients with fractures

of the shaft itself had more than three-fourths of an inch shortening.

Speaking of fractures of the femoral neck alone, we found entirely useful limbs in 13 out of 21 cases traced, or in nearly 62 per cent. Only two patients were entirely incapacitated: one of these, a woman 80 years old, was discharged with an ununited fracture, and died at her home three weeks later; the other patient, a man 78 years old, was living six months after the accident. The average age of the 21 patients traced was over 57 years at the time of the accident; or, if two children of 11 and 15 years be excluded, the average age of 19 patients was over 62 years; 12 patients were actually more than 60 years old at the time of the accident, and 7 of these were over 70 years. Of the 21 patients with fracture of the neck of the femur who were not traced, the average age was 64½ years, 10 of the patients being over 70 years of age. The difficulty of tracing them was no doubt due in part to some of them being dead.

Taking all the remaining fractures together, excluding those of the cervix, there were 40 patients traced. Of these, 36 (90 per cent.) had entirely useful limbs, though 13 of them had a limp. There was marked impairment of function in 2 patients (trochanteric fractures), one of whom, aged 70 years, had had the same femur fractured once before, three months previously; and the other, aged 65 years, sustained, besides the fracture through the trochanters, a Pott's fracture of the same leg. Two patients in this group were found to be incapacitated; both had supracondylar fractures—one, aged 55 years, had previously sustained a fracture of the neck of the same femur, which had united with shortening and deformity; he still uses crutches, over 18 months after his discharge;—the other patient, a woman of 62 years, has advanced rheumatoid arthritis affecting both knees and both hips; she is barely able to totter around her house.

We may conclude, then, that, with the exception of these four patients, the results of the conservative treatment of fractures of the femur, excluding those of the neck, were satisfactory; and we very much doubt whether operative treatment of such cases could do more than give entirely useful limbs in 90 per cent. of cases, and leave only one out of every three patients with no other functional impairment than a limp.

FRACTURES OF FEMUR, EPISCOPAL HOSPITAL. PATIENTS TRACED, 1905–1907 INCLUSIVE.

CERVIX.

1. Matthew G., 64 yrs., July, 1907. Examination 2–12–'08. Habitually uses crutch and cane. Can walk without support of any kind. Goes up and down stairs daily. Is still improving. Shortening 3 cm.; eversion; rotation fair. Abduction possible to 30°, flexion to 135°. Union firm. (Class III.)

2. Irene K., 11 yrs., January, 1904. Report 5–13–'08. No limp; all functions perfect. (Class I.)

3. Mary E., 72 yrs., January, 1905. Report 1–21–'08. Can walk with crutches; goes up and down stairs daily. Was treated by longitudinal and lateral traction. (Class III.)

4. John M., 53 yrs., February, 1905. Examination 1–25–'08. Scarcely appreciable limp. Rotation a little restricted; flexion to 90°; abduction to 10°. Union firm. Shortening 1 cm. (Class II.)

5. Chas. M., 35 yrs., December, 1905. Examination 2–10–'08. No perceptible limp. Shortening 2 cm. Flexion normal; rotation normal; hardly any abduction possible. Was treated by longitudinal and lateral traction. (Class I.)

6. Margaret B., 50 yrs., January, 1907. Examination 2–10–'08. Uses cane on street. Marked limp without cane. Eversion slight; rotation fair; abduction and flexion normal. Union firm. Shortening 2 cm. Was not brought to hospital until 5 weeks after injury in 1907. (Class III.)

7. Jane C., 65 yrs., March, 1907. Examination 5–13–'08. Moderate limp; no disability; good union. Found at her home housecleaning, and moving furniture around. (Class II.)

8. Lena M., 56 yrs., February, 1907. Examination 1–23–'08. Habitually uses two crutches, but can walk with only one cane. Very little limp when using cane. Goes up and down stairs easily. Firm union. Shortening 4 cm. (Class III.)

9. Eliza K., 70 yrs., June, 1905. Examination 4–2–'08.

Slight limp, no cane. Goes up and down stairs often each day, but not leg over leg. Eversion slight, rotation slight, abduction to 18°, flexion to 90°. Union firm. Shortening 1 cm. (Class II.)

10. Pauline T., 55 yrs., January, 1906. Examination 3–23–'08. Decided limp; uses one crutch on street, one cane at home. Goes up and down stairs constantly; uses sewing machine all day, working it with either foot indifferently. Rotation good; flexion to 90°, abduction to 20°. Union firm; shortening 2.5 cm. Was treated by longitudinal and lateral traction. (Class III.)

11. Anna C., 35 yrs., March, 1906. Report 5–13–'08. Marked limp, moderate outward rotation; perfect use. (Class II.)

12. Charles W. S., 70 yrs., June, 1906. Examination 4–20–'08. No limp, no disability of any kind. All functions normal. No shortening. X-ray showed fracture through base of cervix. (Class I.)

13. Mary G., 58 yrs., October, 1906. Examination 5–16–'08. Moderate limp; flexion to 90°; slight eversion. Union firm; shortening 5 cm. Scarcely any disability. (Class II.)

14. Jane McC., 78 yrs., May, 1905. Examination 5–20–'08. Very little limp; scarcely any disability. Union firm. No eversion. Shortening 2 cm. (Class II.)

15. Margaret G., 80 yrs., December, 1905. Report 5–20–'08. Died about three weeks after discharge; never left bed after return from hospital. Recorded in hospital records as "unimproved." (Class IV.)

16. Joseph S., 62 yrs., August, 1905. Report 5–23–'08. Moderate limp; always uses cane. Works as watchman. (Class III.)

17. Catharine B., 63 yrs., November, 1907. Report 5–23–'08. Scarcely appreciable limp; no disability at all. Fracture was impacted. (Class II.)

18. John B. M., 15 yrs., October, 1906. Examination 4–20–'08. No limp; flexion to 15° beyond right angle; abduction 5°; shortening 2.5 cm. Typical case of traumatic coxa vara. (Class I.)

19. Joseph K., 68 yrs., July, 1907. Examination 4–20–'08. No appreciable limp; slight eversion; flexion to 15 degrees beyond right angle; abduction 10°. Shortening 0.75 cm. Works as blacksmith. (Class I.)

20. Maxwell L., 78 yrs., October, 1907. Report 4–20–'08. Incapacitated; unable even to use crutches. (Class IV.)

21. Lydia L., 75 yrs., April, 1905. Report 5–28–'08. Died of pneumonia in January, 1907, nearly two years after fracture of hip. Until within a few days of death walked with scarcely appreciable limp, and with no disability. (Class II.)

THROUGH OR BELOW TROCHANTERS.

1. Gottlieb F., 45 yrs., December, 1905. Examination 5–16–'08. No limp; no deformity. Shortening 1 cm. (Class I.)

2. Carrie M., 12 yrs., June, 1906. Examination 5–16–'08. No limp; no shortening. Treated on double inclined plane. (Class I.)

3. Thomas H., 60 yrs., August, 1906. Examination 5–13–'08. No limp; no disability. Had double fracture of femur. (Class I.)

4. Daniel H., 40 yrs., May, 1907. Examination 4–20–'08. Moderate limp; works as rigger at Cramp's shipyard; climbs ladders constantly. Upper fragment slightly displaced forward. Shortening 4.5 cm. (Class II.)

5. Joseph Q., 57 yrs., September, 1906. Examination 4–20–'08. Limp not noticeable; flexion to 15 degrees beyond right angle. Shortening 1 cm. (Class I.)

6. Bernhard P., 43 yrs., March, 1905. Examination 2–6–'08. No perceptible limp; rotation slightly restricted; all other functions normal. Slight thickening through trochanters. Shortening 2.5 cm. (Class I.)

7. Joseph S., 69 yrs., December, 1905. Report 5–13–'08. Very slight limp; all functions normal. (Class II.)

8. Susan D., 70 yrs., July, 1907. Examination 1–4–'08. Walking with cane; slight limp. Had fractured same femur three months before admission for recent refracture. (Class III.)

9. Annie D., 65 yrs., March, 1906. Examination 5–23–'08. Walks around house without crutch; goes up and down stairs several times daily. Marked limp. Shortening 4.5 cm. Had also Pott's fracture of same leg, at same time as fracture of femur. (Class III.)

SHAFT.

1. Harry M., 6 yrs., September, 1905. Report 5–16–'08. No limp; all functions perfect. (Class I.)

2. Franklin C., 18 yrs., September, 1905. Examination 2–6–'08. Scarcely perceptible limp; all functions normal. Shortening 1 cm. (Class II.)

3. Robert L., 53 yrs., October, 1905. Report 5–16–'08. No limp; no disability; wife cannot tell which was the injured side. (Class I.)

4. John B., 13 yrs., October, 1905. Examination 1–28–'08. No limp, all functions normal. Shortening 1 cm. (Class I.)

5. John R., 34 yrs., November, 1905. Examination 3–19–'08. No limp; all functions normal except flexion of knee, which is impossible beyond 35 degrees more than right angle. Shortening 1 cm. Some callus at site of fracture, which was comminuted. (Class I.)

6. Harry D., 7 yrs., February, 1906. Examination 3–19–'08. Very slight limp; all functions normal. No shortening. Limp probably due to fracture of lower third of leg bones on same side, sustained since recovery from fracture of femur. (Class II.)

7. Geo. M., 54 yrs., May, 1906. Examination 5–16–'08. No limp; all functions normal. No shortening. (Class I.)

8. Fred. K. C., 41 yrs., June, 1906. Examination 4–18–'08. Slight limp; all functions normal. Shortening 0.5 cm. Had same hip injured again shortly after discharge from hospital. (Class II.)

9. Benjamin S., 27 yrs., August, 1906. Report 5–16–'08. Slight limp; all functions normal. (Class II.)

10. John K., 15 yrs., January, 1907. Examination 4–18–'08. No limp; all functions normal. Shortening 1.5 cm. Was crushed in elevator, sustaining contusions of pelvis, fractures of left femur, and of middle third of both bones of left leg. (Class I.)

11. John M., 43 yrs., November, 1906. Examination 5–16–'08. Slight limp; all functions normal; shortening 2 cm. Had also fracture of olecranon. (Class II.)

12. George D., 53 yrs., November, 1906. Examination 4–18–'08. Slight limp; flexion of hip only to 10° beyond right angle; all other functions normal. Shortening 1 cm. When 7 years of age had extensive operation on this femur for osteomyelitis. (Class II.)

13. James H., 10 yrs., May, 1907. Examination 4–21–'08. No limp; all functions normal. Shortening 1 cm. (Class I.)

14. William H., 30 yrs., June, 1907. Examination 5–13–'08. No limp; all functions normal. Shortening 0.5 cm. Had also fractures of both forearms, compound comminuted of left; concussion of brain; and delirium tremens. (Class I.)

15. Albert F., 4 months, September, 1907. Examination 4–21–'08. No deformity; functions all normal. No shortening. (Class I.)

16. John F., 15 yrs., October, 1907. Examination 4–23–'08. No limp; all functions normal. Upper fragment is displaced slightly outwards. Shortening 1.5 cm. (Class I.)

17. William M., 49 yrs., November, 1904. Report 5–18–'08. Committed suicide one year ago. Still had slight limp, but no other disability. (Class II.)

18. Annie K., 70 yrs., December, 1904. Examination 5–18–'08. No limp, no disability. Shortening 1 cm. (Class I.)

19. John S., 8 yrs., May, 1907. Examination 5–18–'08. No limp; all functions normal. Shortening 1.5 cm. (Class I.)

20. Joseph C., 5 yrs., November, 1907. Examination 5–18–'08. No limp; all functions normal. No shortening. (Class I.)

21. Joseph G., 16 yrs., March, 1906. Report 5–23–'08. Very slight limp; no disability at all. Same femur broken twice. (Class II.)

22. Marie K., 2 yrs., August, 1906. Examination 5–23–'08. No limp; all functions perfect. No shortening. (Class I.)

SUPRACONDYLAR.

1. Ungar D., 29 yrs., July, 1905. Report 5–16–'08. Had slight limp two years ago. (Class II.)

2. Samuel M., 44 yrs., September, 1905. Examination 1–30–'08. Scarcely perceptible limp; full extension, but flexion only to 10 degrees beyond right angle. Shortening 3 cm. This was a fracture through the external condyle, involving the knee-joint; and the patient had had a fracture through lower third of same femur five years before this injury. (Class I.)

3. Arthur D., 7 yrs., January, 1906. Examination 3–19–'08. No limp; not quite complete extension of knee. No shortening. This was a compound epiphyseal separation. (Class I.)

4. Nellie S., 27 yrs., February, 1907. Examination 5–16–'08. No limp; flexion of knee only to right angle; all other functions

normal. Shortening 2 cm. This was a fracture of external condyle, involving joint. (Class I.)

5. Mrs. W., 63 yrs., March, 1907. Examination 5–13–'08. Marked limp; no disability. Shortening 3 cm. (Class II.)

6. John D., 45 yrs., December, 1907. Examination 4–21–'08. Marked limp; all functions normal. Lower fragment is posterior and external. Wears heel three-quarters of an inch high. Shortening 4 cm. (Class II.)

7. William M., 65 yrs, April, 1905. Examination 5–20–'08. No limp; no disability. Shortening 5 cm. (Class I.)

8. Hannah C., 62 yrs., May, 1905. Examination 5–20–'08. Crippled by rheumatoid arthritis in knees and hips; barely able to walk; has not been out of house since return from hospital. Does no work. Right knee is more stiff and disabled than the fractured knee. (Class IV.)

9. James McC., 55 yrs., October, 1906. Report 5–20–'08. Incapacitated; still uses one crutch and cane. This fracture involved knee-joint; and the patient had previously had a fracture of cervix of same femur, which had united with shortening and deformity. (Class IV.)

Dr. Richard H. Harte said he could not understand why so many surgeons, instead of sticking to old and tried methods of procedure always wanted to try something else just because it was new. He really thinks it remarkable that in fractures of the thigh the results are so good, for he thinks this bone, above all others, is badly treated. Everyone seems to think that in order to treat a fracture of the thigh all that is necessary is to hang on to the heel 6 or 8 pounds of weights, paying no attention to the extension of the leg or the relative position of the sand-bags to the leg.

He thinks Dr. John Ashhurst is the surgeon to whom the greatest thanks are due for the conservative treatment of fractures of the thigh. To obviate the use of sand-bags he reverted to the use of the old-fashioned Dupuytren's splint in conjunction with bran-bags and weights.

Dr. Harte does not recall a single case of ununited fracture of the thigh in his experience. In cases where there are multiple fractures, great allowance should be made, as Nature is only capable of repairing a certain number of fractures at a time. Very often the larger bone is the one which will be the slowest to unite.

Dr. G. G. Davis said he thought the results in these cases rather surprising. When it comes to fractures below the neck we rather expect unfavorable results, but here in 21 cases of the neck we find 5 cases with apparently perfect functional results; 8 with no disability but a limp; 6 with marked impairment of function; and only 2 incapacitated. It is not infrequent for patients with intracapsular fractures to take to their beds and remain there until they die. Dr. Davis thought if the impairment of function in the 6 cases mentioned even allowed the patients to get around at all, that the results were surprisingly good, particularly when it is remembered that in these cases there were various forms of treatment. He understood that some of the methods pursued were not the so-called modern methods of abduction or lateral traction, but were simply the employment of the ordinary Buck's extension.

Dr. A. P. C. Ashhurst, in closing, said that of the 5 patients with fracture of the neck of the femur who recovered without functional impairment, two were children; one was a man 70 years of age. When this latter patient came back to the hospital with no impairment whatever, it was necessary to look up his history, which showed that the diagnosis had been confirmed by a skiagraph, to convince the examiners that he had really sustained a fracture of the neck of the femur. Dr. Ashhurst added that Dr. Newell and he agreed entirely with Dr. Harte that the question of shortening was of secondary importance, since, as Dr. Harte said, it was of course impossible to know what had been the length of the fractured limb before the accident. He thought, however, if a patient had been so unfortunate as to have one leg an inch or more longer than its fellow, he would have to be congratulated should the result of his fracture enable him to be discharged with two legs of equal length.

GERSUNY'S OPERATION FOR THE CURE OF ENURESIS.

Dr. Gwilym G. Davis presented a young girl, aged 15 years, who was admitted to hospital under his care with the following history: She had had most all of the diseases of childhood besides typhoid fever. Menstruation began at the age of 12, and she stated that she did not menstruate from the vagina but at each monthly period had considerable bleeding from the nose accompanied by headache. A year and a half previously she passed

through an attack of typhoid fever at another hospital. She has always been of a nervous disposition and a year ago began to have nocturnal incontinence of urine. She passed urine involuntarily five to seven times each night. She was under treatment for the trouble in the medical ward and was afterwards operated on for appendicitis three months previous to her present operation.

Urine: Sp. gr., 1020, acid, no albumin nor sugar; few epithelial cells; no urethral polypus or other abnormal conditions.

She was etherized and the urethra surrounded by a circular incision and loosened from its surroundings. It was then twisted three-fourths of a turn on its longitudinal axis until a feeling of resistance was experienced, the margin was then sewn to the adjacent tissues by interrupted sutures of fine chromic gut. A catheter was inserted and retained for two or three days. Primary union occurred and she was soon discharged from the hospital cured.

The procedure used in this case was that devised by Gersuny (Centralblatt für Chirurgie, 1888) and is similar to his well-known operation for incontinence of feces (Centralblatt für Chirurgie, 1893, 261). While his operation on the rectum is widely and favorably known, his operation on the urethra is comparatively little known and rarely employed. Incontinence of urine is so much more common than incontinence of feces that the field for the operation in the former class is much the wider. It is an operation comparatively easy of performance, lacking in any serious danger or after-effects and apparently efficient. It only needs to be more widely known in order to be more extensively employed.

A METHOD OF ANASTOMOSING THE DIVIDED VAS DEFERENS.

Dr. Gwilym G. Davis said that a couple of years ago while aiding an inexperienced assistant to do an operation for the radical cure of an inguinal hernia the vas deferens was torn. It was strongly adherent to the hernial sac and in attempting to detach it he tore it in two.

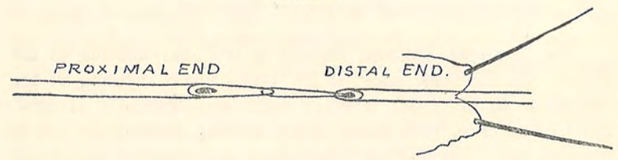
At the time the only methods known to Dr. Davis of repairing the injury were those which had been used for anastomosis of the ureter. The only method, as far as he knows, which has been devised for the anastomosis of the vas deferens is that of

G. Frank Lydston (Annals of Surgery, July, 1906, p. 92, vol. xliv.) who cut the ends off square, then introduced a filament of silkworm gut on a filiform bougie through an opening in the side and sewed the two square cut ends together. The sheath of the cord was then sewn around the point of union and the bougie withdrawn in ten days.

The method adopted in the present case was a modification of that devised by Poggi for the ureter. Poggi (Archives Provinciales de Chirurgie, vol. vi, June 1, 1896, quoted by Morris Surg. of Kidney and Ureter) dilated the distal end of the ureter and drew the proximal end into it by two sutures, one on each side. Both ends of the ureter were cut off square.

Mayo Robson modified this by slitting the distal end to facilitate the entrance of the proximal end. Van Hook introduced the proximal end through a slit in the distal end on which a ligature had been placed to close its extremity. In the case now reported the proximal end of the divided vas was cut off obliquely so as to leave a moderately long pointed extremity; the distal end was cut off on a short bevel, about 45°.

Fig. 1.



A piece of fine catgut was then threaded on two fine round sewing needles. One of these needles was passed through the tip of the proximal end then introduced into the lumen of the distal end and made to pierce the wall well beyond the opening. The second needle was then likewise introduced and brought out close to the first (Fig 1).

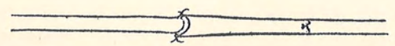
Traction was made on the threads and the pointed extremity of the proximal end entered the lumen of the distal end without the slightest trouble until its apex reached the point of emergence of the needles. The catgut was then tied and the apex fixed in place. Two additional fine catgut sutures were introduced, fixing the extremity of the distal end to the side of the proximal end

as seen in the lower figure (Fig. 2). Healing occurred by primary union, no epididymitis nor testicular complication occurred, and as far as known the result was satisfactory.

In making the anastomosis care should be taken not to make the pointed bevel on the proximal end too long and also to introduce the needles nearly or quite their fell length before piercing the side of the tube. The object of these two precautions is to separate as far as possible the two openings in the proximal and distal ends.

It appears to be unnecessary to slit the ends as did Mayo Robson and Van Hook in the ureter, and the procedure seems both easier of performance and more sure than that of Lydston.

FIG. 2.



DR. JOHN H. GIBBON, relative to the anastomosing of the divided vas deferens, asked if Dr. Davis knew anything of the end-result in his case; whether there was testicular atrophy. Dr. Gibbon once, very much to his distress, divided the vas in a young man, and did an invagination anastomosis, very much after the style of Murphy's anastomosis of a blood vessel. Although he was very much disappointed at the time of this accident, he got a great deal of comfort in finding out that a number of men who had done a large number of hernia operations had had a similar experience. He feels certain, however, that such an accident having once occurred, it is never likely to be done by the same operator again. In reply to this question Dr. Davis stated that the later history of the patient was not known to him.

THE USE OF ETHYL CHLORIDE AS A GENERAL ANÆSTHETIC IN THE PENNSYLVANIA HOSPITAL.

BY W. ESTELL LEE, M.D.,

Chief Resident Physician of the Pennsylvania Hospital.

DR. CHARLES F. MITCHELL, in the winter of 1902, first used ethyl chloride for general anæsthesia in the receiving ward of the Pennsylvania Hospital, and it proved so satisfactory for short light anæsthesias that it was introduced into the general surgical wards and there used for minor operations and painful surgical dressings. Dr. Francis O. Allen, when Resident Anæsthetist, first used it in combination with ether and chloroform during the early part of 1903.

There are now records of its use in 5575 cases during the period commencing December, 1902, and ending June 1, 1908, as follows: Alone, in 947; with anesthol, in 47; with anesthol and ether, in 391; with ether, in 4148; with scopalamine and morphia, in 1; with chloroform, in 2; and with intraspinal injections of stovaine, in 39.

The youngest patient was 24 hours old and the oldest 84 years. The lengths of the anæsthesias have varied from several seconds to 54 minutes. The average dosage for 3 minutes has been 10 grammes.

Bengue's preparation of ethyl chloride was first used, but it was soon found that an American product known commercially as antidolorin was just as satisfactory and the latter has been used in practically all of the cases.

Several of the many forms of closed and semiclosed inhalers devised for its administration have been tried and abandoned for gauze. If a prolonged anæsthesia is desired or the ethyl chloride is to be followed by another anæsthetic, the patient should have the usual anæsthetic preparation; otherwise, it may be given without this preparation. Lying in the supine position the patient is told to breathe quietly, close the

eyes and prepare for sleep. Upon several layers of wide mesh gauze, held from 6 to 8 inches from the face, the anæsthetic is slowly dropped. As the patient becomes drowsy the dose is increased and the gauze brought closer to the face and with the loss of consciousness, the gauze, 4 to 8 layers thick, is placed over the mouth and nose and the ethyl chloride given with the spray. Sometime before the loss of consciousness the patient is anæsthetic to very severe pain and many minor operations requiring but a few minutes may be done in this stage. Frequently in this stage there is a respiratory arrest, especially if the anæsthetic has been given too rapidly or too concentrated, but with its continued administration the respirations are resumed becoming slower and deeper. With the progress of the anæsthesia the eyeballs begin to roll and the pupils partially dilate when the patient enters the second stage, in which there is deep anæsthesia without, however, much muscular relaxation and with, frequently, considerable muscular rigidity and spasm. Progressing still further the eyeballs become fixed, the pupil widely dilated and immobile, the corneal reflex disappears and the face is flushed and covered with perspiration. This is undoubtedly the danger-line beyond which the respirations become insidiously shallower with consequent deepening cyanosis, there may be an external squint of the eyeballs and frequently muscular rigidity and spasm or as rarely occurs general relaxation. The fatalities seem to be due primarily to respiratory and secondarily to cardiac failure. Large and Brown, in their experiments on dogs, seem to have confirmed the clinical observations that there is always a fall of blood-pressure, which in a few cases may be preceded by a temporary rise, and their explanation of the respiratory failure is that it is due to a paralysis of the respiratory centre produced possibly by the lowered blood-pressure.

When ether is to follow the ethyl chloride it is gradually introduced drop by drop upon the same gauze at the period when the patient loses consciousness and while its dosage is rapidly increased, the ethyl chloride is gradually withdrawn. If, however, a sudden change is made from the ethyl chloride

to the ether, the patient will in the majority of cases recover from the ethyl chloride intoxication before that of the ether appears. It is the feeling in the hospital that with this slow induction requiring from 2 to 3 minutes, the gradually increasing dosage and the free admission of air allows a more careful observation of the progress of the anæsthesia and a timely recognition of the danger-line, and when one remembers that with large concentrated doses and a closed inhaler a patient can be carried beyond this line in from 8 to 20 seconds this will be understood, also with this method we do not have the frequent occurrence of muscular spasm, post-anæsthetic vomiting and headache so strongly emphasized by those using the closed method.

Safety is undoubtedly the first consideration in the use of any anæsthetic and though ethyl chloride has been used since 1847 and very generally used in England and on the continent since 1897 there is still a great difference of opinion as to its mortality. Hewitt places it between ether and chloroform with an estimated mortality of 1–10,000 and in the latest edition of his book quotes McCardie's figures of 1–3000. Luke makes one estimate of 1–8000 and a few months later 1–150,000. Each of these men have had personal experience in over 2000 cases without any fatalities. Herrenknecht reports 3000 cases without a mishap.

Such varied difference of opinion, Hawley suggests, would indicate that there may be other elements present, independent of the anæsthetic itself, to cause death, and a careful analysis of the reported fatalities seems to support this suggestion. There are recorded in literature in a rather imperfect way some 21 cases which have been collected by Luke, and to these we now add 4 more. Another fatal case reported by Dr. Allen is case No. 3 in this list.

In view of Hawley's suggestion an analysis of these cases is very interesting.

Case 2 was a 12-months-old child with diphtheritic laryngeal obstruction.

Case 5 was a large healthy man 24 years of age with a huge

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Case 5 was a large healthy man 24 years of age with a huge

submaxillary abscess. Several minutes after the removal of the anæsthetic and after the abscess had been opened, respirations stopped so suddenly as to suggest that there was some acute laryngeal obstruction. At least four minutes later a tracheotomy was done without the reëstablishment of respiration. The autopsy showed marked œdema of the glottis with a relaxed fold of the mucous membrane over the abscess wall " which might have been " sucked into the small air-passage of the glottis.

Case 6, a male 67 years old, whose autopsy showed a very large mass of malignant cervical glands encroaching upon the lumen of the pharynx and larynx and involving the vocal cords.

Case 3, reported by Dr. Allen in 1903, was a colored man 28 years of age with an incarcerated hernia. He had been vomiting freely but the vomitus was not fecal in character, otherwise his condition was good. During the change from ethyl chloride to ether he suddenly recommenced vomiting and brought up large quantities of a clear fluid. This lasted three to four minutes, after which respirations were not resumed. An examination by the surgeon failed to show any pharyngeal or laryngeal obstruction and he considered it an anæsthetic death. There was no autopsy.

Case 22.—Ethyl chloride was chosen as the anæsthetic for a negro 17 years of age, with an acute ischio rectal abscess, because of a harassing cough, profuse expectoration and signs of a chronic consolidation of the left lung. He was placed in the lithotomy position, and though never deeply anæsthetized, received considerably more than the usual ten grammes for the anæsthesia extended over a period of more than 15 minutes. Ten or fifteen minutes after the withdrawal of the anæsthetic there was a violent paroxysm of coughing, after which the respirations ceased and were not reëstablished with vigorous stimulation, artificial respiration and tracheotomy. The pulse in this case continued beating for some time after the respiratory arrest. At the post-mortem examination the whole left lung was found to be involved in a tuberculous consolidation with a small cavity in the apex; there was a tuberculous pericarditis with a large amount of fluid in the sac and a tuberculous peritonitis.

Case 23.—A negro 30 years old, while attempting a highway robbery one week previous to his admission to the hospital, received a load of buckshot in the lower part of the left axilla.

He had remained in hiding all this time without medical attention and when he entered the hospital there was a large gaping wound in the lower portion of the left axilla and the physical signs of a general peritonitis and profound sepsis. While being placed upon the operating table his pulse became imperceptible and after receiving less than a gramme of ethyl chloride given in the usual way and before any operative procedure could be commenced his respirations gradually ceased. The autopsy showed a large wound of the left pleura and an empyema of the same pleural cavity; a wound and empyema of the pericardial cavity; a wound of the diaphragm; perforations of the stomach and intestines and a purulent peritonitis.

Case 24.—D. H., an unmarried negress, 30 years of age, was being treated in the medical wards for Adiposa Dolorosa and developed a Ludwig's Angina, associated with marked laryngeal obstruction. Incisions beneath the jaw opened the sublingual tissues and allowed a few drops of pus to escape. When the patient was placed in the dorsal position the laryngeal obstruction was considerably increased and after receiving about 5 grammes of ethyl chloride given in the usual way her respirations stopped, the pulse remaining unaffected, but with the removal of the anæsthetic and artificial respiration they were quickly resumed. Twenty-four hours later, the œdema and the laryngeal obstruction having increased, another operation was attempted and as before the respiratory obstruction was greatly increased by the dorsal position and after receiving about a gramme of ethyl chloride it became complete and was never reëstablished, though a quick tracheotomy was done. The autopsy showed acute inflammation and œdema of the pharyngeal, sublingual and cervical tissues with œdema of the glottis.

Case 25.—A young married negress with the diagnosis of tubo-ovarian abscess was given an unknown quantity of ethyl chloride preliminary to a proposed ether anæsthesia. After taking the anæsthetic for one or two minutes the respirations suddenly ceased and though the pulse could be felt for a short time after the respirations had stopped it soon disappeared and cardiac stimulants together with artificial respirations produced no effect. There was no postmortem examination and a physical examination made just before the anæsthetic was given was negative except for the presence of a loud systolic heart murmur without any signs of lost compensation.

Seven of these fatalities recorded in the literature occurred during dental operations and the anæsthetic was given by the dentist or his assistant. In eight cases the patients were in the upright position when the ethyl chloride was administered. In seven cases where the method is recorded a closed or semi-closed inhaler was used 3–6 c.c. of the ethyl chloride being sprayed at once into the bag and given to the patient.

The occurrence of several deaths under anæsthesia at Guy's Hospital is the cause for an editorial in the *Hospital*, London, in which anæsthetic deaths are carefully considered. During the period of 6 years from 1901 to 1907 there occurred at Guy's 36 deaths under anæsthesia; in another hospital 31 in 85,000 anæsthesias, and in still another 7 in three years. And it raises the question of whether it is right to credit all of the operative deaths which occur under anæsthesia to the anæsthetic when the surgeon wishing to give the patients every possible chance will operate upon them when almost moribund. It also criticizes the compiling of statistics from various hospitals and thus estimating mortalities.

With these criticisms in mind we have reviewed the records of all the anæsthesias given in the hospital during this same period of five and a half years. They were administered by the Resident Anæsthetizers and Resident Physicians. Squibb's ether was used in practically all of these cases. In a very few, during the early part of the period, the anæsthetics were given with an Allis inhaler, in all of the remaining ones the gauze and drop method was employed.

There have been 5575 cases in which ethyl chloride has been used as a general anæsthetic and during the administration of which 5 cases died. The ethyl chloride was used alone in 947 times and all of these deaths occurred while it was being used in this way and none when used in combination with other anæsthetics, ether, chloroform, or anesthol, of which there were 4628. The fact that the ethyl chloride was given first and to all the cases which were considered bad anæsthetic risks distorts these statistics:

Ether was given 5592 times and during its administration 3 deaths occurred. As with the ethyl chloride all of these deaths occurred while it was being used alone in 1444 cases, one as the operation was begun, the other two near their completion.

An agent which may in 15–20 seconds produce deep anæsthesia and whose danger-signs are so easily passed cannot be used with impunity, and a few of the reported fatalities certainly demonstrate its danger in inexperienced hands. Another objection to its use is the muscular spasm and rigidity which occurs especially in alcoholics and very frequently in others. This, however, may be overcome more or less by the preliminary use of morphia and atropine and by following the ethyl chloride with ether.

Its advantages, on the other hand, are very tempting. For the patient there is no irritation of the respiratory tract with its usual coughing, increased secretions, gagging and vomiting; and therefore no respiratory struggle so often seen in ether and chloroform anæsthesia. The rapid onset of unconsciousness is not to be overlooked and its advantage will be appreciated by any who have taken ether patiently for 6 to 10 minutes. And most important the usual amount of ether necessary for the induction of anæsthesia to the third stage is eliminated and as this averages four ounces with the open drop method the excretory organs are saved a considerable task. In our experience it certainly lessens the occurrence of post-operative vomiting.

To the anæsthetist the ease and rapidity of induction with complete elimination of the preliminary stages of ether and chloroform speaks for itself.

Though the mortality with ethyl chloride in this series of cases, is apparently greater than that of ether it is still being used in the hospital for (*a*) minor surgical procedures where a short anæsthesia of a few seconds to five minutes is desired; (*b*) the dressing of the more painful surgical wounds, such as the removal of abdominal packs; (*c*) and in combination with ether and chloroform.

Dr. G. G. Davis asked how many of the patients which died were colored people? He thinks anæsthetics are far more fatal with this race than with white people because their color prevents the early recognition of the changes due to failure in the circulation.

Dr. John H. Gibbon said Dr. Lee had shown how superlatively statistics can lie, and he thinks that everyone reaches his own conclusions as to the safety of anæsthetics from his personal experience. For five or six years Dr. Gibbon has used chloride of ethyl absolutely for short operations, nothing but chloride of ethyl, and practically always uses it as a preliminary to ether. He has in his experience but one death to report. That was in a man who had a Ludwig's angina and an endocarditis. He was afraid to give him any general anæsthetic because of his heart condition, and therefore infiltrated the line of incision with Schleich fluid first, and then he found that the patient had a lot of exudate deep down in his neck and manipulation was very painful, so it was necessary to give him an anæsthetic. Chloride of ethyl was given, followed by ether, and Dr. Gibbon then evacuated a quantity of turbid fluid from behind the sternum. Just as this fluid was evacuated the patient ceased breathing and died on the table. No ether had been given for a number of minutes, as the patient seemed completely anæsthetized. A quick tracheotomy was done and artificial respiration kept up for some time, but without avail.

As Dr. Lee has said, deaths in these cases occur from any anæsthetic. Excepting the case just recorded Dr. Gibbon has never had a death from chloride of ethyl, and he has used it thousands of times with the greatest impunity. His feeling is that in safety it occupies a place between ether and chloroform. Most people think it more fatal than ether, and probably less than chloroform. Dr. Gibbon gives it to the youngest and to the oldest patients—children a few days old, very ill patients with typhoid perforation, and patients with tuberculous lesions of the lungs. It is the anæsthetic of choice in his worst cases.

In one, a tuberculous case, he resected four ribs for empyema, and he has done other extensive operations lasting as long as twenty minutes. In the cases where death has occurred, he thinks it would have occurred with any anæsthetic. He has had more than one death occur on the table from ether alone, and in one

of these cases there was no pulmonary or cardiac lesion. The patient was suffering from tuberculous glands of the neck and died just as the incision was made.

Dr. Gibbon's experience with chloride of ethyl makes him feel that it is a safer anæsthetic than ether. It is not disagreeable to take, and he says this because he has himself taken it. He does think it should be given with discretion. It has the great advantage of shortening the time for the anæsthetic and cutting down the amount of ether which the patient will have to inhale and afterwards eliminate.

In comparing the mortality in anæsthesias we should also include the cases of postoperative pneumonia, bronchitis and suppression of urine occurring as a result of ether.

Dr. A. P. C. Ashhurst reminded the Fellows that his father, the late Dr. John Ashhurst, Jr., used to lay a great deal of stress on giving ether in a good light, and constantly inveighed against the miserable dark holes provided for the administration of anæsthetics in one large hospital to which he was surgeon.

Dr. Richard H. Harte had used ethyl chloride a great deal and for many years, but is not as enthusiastic over its use as some operators are. Every time he gives it it is with a feeling of uncertainty, because one cannot carelessly give an anæsthetic which is so quick in its action. He has many times started to count twenty with the beginning of this anæsthetic and by the time twenty would be reached the patient would be completely anæsthetized. The great danger of this anæsthetic is therefore the little warning which is given. It is, however, one of the most delightful anæsthetics which can be imagined—no nausea, no choking sensation, no distress of any kind, the patient simply passing into a quiet sleep.

Dr. Harte feels, however, that if it was used as indiscriminately and as carelessly as is ether, the mortality from its use would be much greater. He considers it a great wonder, with the careless way in which ether is administered, that its mortality is not greater. Ethyl chloride is given by few surgeons, and only practically by persons skilled in its use or in the use of anæsthetics, and consequently the mortality rate is low. It has a great many advantages, particularly preliminary to the administration of ether, and it has also undoubtedly cut down the quantity of ether necessary to complete unconsciousness.

Dr. Harte never gives ethyl chloride except as a preliminary in any case where he expects a delay. He uses it for opening an abscess or for putting in a drainage-tube, but where the patient is to be kept under the anæsthetic for any length of time, say more than five or six minutes, he does not use ethyl chloride.

Relative to the remark made by Dr. Gibbon that he had never experimented with anæsthetics on himself, Dr. Harte thought more could be learned from such experimentation than from the anæsthetization of five hundred other people.

Dr. W. Joseph Hearn agreed with Dr. Harte that the rapidity with which anæsthesia is induced with chloride of ethyl is its chief danger. A few years ago at the Jefferson Hospital when the bottle of ether was immersed in a tub of hot water during administration it was found that the concentration of the vapor was too great, and this method of administration consequently had to be abandoned because the anæsthesia was induced so rapidly that it was hard to recognize the danger signals.

Dr. Walter E. Lee, in closing, said that in regard to the color of the patients who died, all five of them were negroes and that one of the ether deaths occurred in a patient of this same race. The question of the rapidity of the appearance of anæsthesia, of which Dr. Harte and Dr. Hearn have spoken, is undoubtedly an objection to the general use of ethyl chloride. As it is given in England in large mass doses of from 3 to 10 c.c. in a closed inhaler with the admission of very little air, deep anæsthesia is reached after 5 or 10 inspirations. In Dr. Lee's experience the danger signs during the administration of ethyl chloride are very difficult to recognize, the slowing of the respiration is insidious and they have probably ceased for some seconds before the anæsthetist realizes it. For this reason the closed inhalers have been abandoned in the hospital and the open method used which has lengthened the administration period from 8 to 10 seconds to 3 to 4 minutes, giving more time for the recognition of the danger signals.

STATED MEETING, HELD OCTOBER 5, 1908.

The President, Dr. William T. Taylor, in the Chair.

GUNSHOT-WOUND OF THE ABDOMEN.

Dr. Charles F. Nassau presented three patients who had sustained gunshot-wounds of the abdomen. He said that it had always been his practice to immediately explore all gunshot-wounds in which there was a possibility that the ball might have entered the abdomen. Naturally, one should not do this, unless surrounded by the proper conditions and with the proper help to go ahead and perform any operation that the conditions found might necessitate. It seemed to him axiomatic that no gunshot-wound or stab-wound should be treated expectantly where there is the slightest suspicion of penetration of the abdominal cavity. The risks of delay are so disastrous and the danger of exploration so slight that the patient should be given the benefit in every instance.

Case I.—A white woman, aged 22, married, was admitted to St. Joseph's Hospital January 16, 1906, with the history of having been shot by her husband. When seen by Dr Nassau about three quarters of an hour after the injury, she showed such marked symptoms of internal hemorrhage that she was removed at once to the operating room. She was etherized, scrubbed and operated upon at once. The wound of entrance was situated about two inches to the left of the middle of a line drawn from the anterior superior spine of the ilium of the umbilicus. The ball had travelled upward and inward for about three inches in the abdominal wall, before it penetrated the peritoneal cavity. On opening the abdomen, there was a free gush of a large quantity of bright red blood which was found to be coming from a large vessel towards the root of the mesentary of the small intestine. This was at once ligated. There were found altogether five perforations of the small intestine, two perforations of the mesentery, and one each of the greater omentum and the gastrocolic omentum. The patient was given an intravenous transfusion of salt solution during the course of the operation. She was on the