

the profunda into two vessels which reunite at a variable distance above the opening in the adductor magnus, to form a single popliteal artery.

"2. A vas aberrans may leave the external iliac artery and running by the inner side of the common femoral artery, may join the superficial femoral about the apex of Scarpa's triangle.

"3. The main artery of the limb may be found wholly at the back of the thigh, and be derived from a greatly distended sciatic artery.

"4. The profunda may arise from the inner or from the posterior side of the main vessel, and may take origin more than one inch or less than two inches below Poupart's ligament.

"5. The circumflex arteries may arise in whole or in part from the femoral; this especially applies to the internal circumflex.

"6. The femoral may give off the deep epigastric, the circumflex iliac, or the great saphenous artery. The last named vessel arises above or below the origin of the profunda, and passing along Hunter's canal, becomes superficial at the inner side of the knee, and follows the internal saphenous vein to the ankle." (Treves.)

CONCLUSIONS.

1. Amputation of the leg is not always necessary when the lumen of the femoral artery or vein or both, is suddenly or slowly occluded by injury or otherwise.

2. It is better to ligate the femoral artery or vein, or both, and give the patient the benefit of a doubt than to amputate immediately.

3. It is impossible to determine the circulation of the thigh or any given part of the human body without a complete dissection, which can only be done post-mortem.

4. Ligating the femoral artery or vein, or both, in chronic pathologic conditions of the thigh, seems less likely to result in death or gangrene than when the ligature is applied in case of accidents in a normal thigh.

5. It can not be determined what role, if any, any one of the six varieties of the femoral artery has played in any case in which the femoral artery or vein, or both, have been ligated, as no record of dissection seems to have been made.

6. While end-to-end anastomosis may be accomplished, complete occlusion sooner or later takes place.

7. Suturing and the application of ligatures to arteries and veins which have been lacerated have no advantage over complete immediate occlusion by ligature.

8. Gangrene is possibly due to septic infection and not merely to the occlusion of the femoral artery or vein, or both, unless the vessels for collateral circulation are absent.

9. The preservation of the leg does not seem to depend upon the ligating of the femoral artery or vein, or both, at any particular point.

DISCUSSION.

DR. THOS. H. MANLEY, New York City.—This paper of Dr. Ricketts is peculiarly rich in suggestion and raises so many points for discussion, that to cover them all would be impossible, within the range of time permitted. Those of us who have made an experimental study of the circulation must come to the conclusion that all the phenomena of the circulation are not altogether understood by the physiologist. As an illustration of that, in the course of my own experiments I ligated the aorta, the iliac and the brachial arteries of a frog, but found that the circulation went on quite the same as when the heart was unhampered. I found, therefore, that the circulation was to a certain extent quite independent of the heart's action. The point raised by Dr. Ricketts is a very important one, and I have been able to verify it several times in cases of moist gangrene; the primary trouble beginning in the veins. It is probable that in almost all these cases where

the senile changes set in the primary lesion is in the veins of the periphery of different areas of the trunk. We have also found lately that what has been submitted by Bennett, in the operation for varicose leg, is another rebuttal of the theory, showing that the simplest way to treat a varicose vessel is to strip the saphenous vein, choke off the circulation, divide it, and destroy the vein, thereby diverting the blood from the periphery to the center, although the distal distended veins remain.

TUBERCULOSIS OF PHARYNX.*

WITH PRELIMINARY REPORT OF TUBERCULOUS INFECTION OF TONSILS AND LYMPHOID TISSUE OF NASO-PHARYNX.

BY CLEMENT F. THEISEN, M.D.

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It is a strange fact that although pulmonary tuberculosis carries off more of the human race than any other disease, its local manifestations in the upper respiratory tract occur with comparative infrequency. The larynx is much more often affected than the pharynx. In 1226 cases of tuberculosis, Heinze found the larynx involved in 276 or 30.6 per cent. Mackenzie, in 100 cases in the second and third stages, found changes in the larynx in 71. Tuberculosis of the pharynx must be regarded as an extremely rare condition. Lennox Browne¹² states that acute tuberculous sore throat occurs in about 1 per cent. of all cases of tuberculosis of the upper air-passages. This percentage, according to the consensus of opinion, is if anything too large. Willigk, in 1307 autopsies, found only 1 case of pharyngeal tuberculosis. Bosworth²⁸, who thinks that tuberculosis of the fauces is an evidence of acute miliary tuberculosis, has only seen 5 cases. Levy²⁹ has reported 162 cases of tuberculosis of the pharynx and larynx. In 17 of these, the pharynx only was diseased. It is rather difficult to explain if the statement made by Wright¹⁷ and Schmidt²⁹, that the tubercle bacillus may penetrate the perfectly intact epithelium, is correct, why tuberculosis of the pharynx is so rare, as bacilli are frequently found in the nasal cavities and throats of healthy people. Strauss⁵ examined the dust and mucus from the nasal cavities of 29 persons, all in the best health, with no indications of tuberculosis. Bouillon cultures were made and the fluid injected into 29 guinea-pigs. Injections were made into the peritoneum: Seven died of septicemia or purulent peritonitis, 13 remained healthy and 9 got tuberculous processes, which plainly started in the peritoneal cavity.

In children pharyngeal tuberculosis is even a much rarer condition. Schifferowitsch³, in a thorough search of the literature, has been able to find only 87 cases reported up to 1887, and only 1 case in a child—6 years old. Other cases of faucial tuberculosis in children have been reported by Siegert³⁰ and Gee¹. In one of Siegert's cases, that of a boy aged 11, there were present superficial ulcers of both tonsils, mucous membrane of soft palate, uvula and a portion of the posterior wall of the pharynx. There was also tuberculosis of the lungs. In the second case, a girl of 4½ years, the ulceration involved the right side of the soft palate, the right palatine arch and the left faucial pillar. The lungs were not involved in this case. In Gee's case, a child 7 years old, there were tuberculous ulcers of the soft palate, uvula, base of tongue and epiglottis; there was also pulmonary

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tuberculosis. Frobilius² has recorded 18,569 autopsies of infants in the first four months of life, in 416 of whom tuberculosis was the cause of death; the pharynx was not affected in a single case.

Pharyngeal tuberculosis is as a rule secondary to the lung involvement, or may be coincident with it and is usually a symptom of acute general tuberculosis. In many cases the sputum causes the infection, but in the large majority it is undoubtedly conveyed by the blood and lymph channels. The ulcers probably result from the breaking through of tubercles toward the surface of the mucous membrane, and the breaking down of many small tubercles forms the larger ulcers. The rapid extension of the ulceration is without doubt favored by the presence in the throat, at the same time with the tubercle bacilli, of pus-producing bacteria. Fraenkel⁴ has demonstrated the frequent presence of the staphylococcus pyogenes aureus and the streptococcus pyogenes in throat tuberculosis.

Pharyngeal tuberculosis may be also secondary to tuberculous caries of the cervical vertebræ. According to Osler¹³, tubercular adenitis of the cervical glands and tuberculosis of the pharynx in children, may follow tubercular processes of the axillary glands or carious cervical vertebræ.

Primary cases, although exceedingly rare, have been reported. Rosenberg⁴², in 22,000 throat diseases, has reported 22 cases of pharyngeal tuberculosis, 3 of which were primary. Out of 7 cases observed by Delavan⁴³, one had its primary seat on the velum. Pluder²³ has seen a case in a male of 16 years. There was extensive ulceration of the posterior wall of the pharynx extending into the posterior nares, and of the surface of the right tonsil and uvula. There was no evidence of pulmonary tuberculosis. Another case has been reported by Crossfield⁷; in this case there was primary pharyngeal as well as laryngeal tuberculosis. One case has been reported by Chappell²¹; Rethi²⁵ has reported a case starting from the posterior pharyngeal wall. A case of extensive ulceration of the entire palate and larynx with little lung involvement has been described by Zarniko⁹. Mention must again be made of Siegert's second case.

Other cases of pharyngeal tuberculosis have been reported by Heindl²⁶, Griffin¹⁵, Bowlby⁸ and Parker²². In Parker's case there was ulceration of the right tonsil, nasopharynx and soft palate, which developed after the removal of enlarged tonsils and adenoids. Smith³⁵ has seen 5 cases of tuberculous ulceration of the soft palate and adjoining soft tissues. Catti⁶ has described a pharyngolaryngeal type of acute miliary tuberculosis. In children it may be mistaken for diphtheria; it runs a very acute and rapid course.

Only two cases of pharyngeal tuberculosis have come under the writer's observation:

CASE 1.—Henry R., aged 21, native of U. S. The ulceration, when the case was first seen, involved a large portion of the posterior wall of the pharynx, uvula and tonsils, and extended into the nasopharynx. There was extensive lung involvement. The larynx was almost free from ulceration. The disease ran a rapid course, terminating fatally within six weeks after the patient came under my observation. Iodid of potash had been tried without effect.

CASE 2.—E. L., a young woman 22 years old, native of U. S. In this case the pharyngeal ulceration was very slight and started on the posterior wall. There was present a superficial ulcer half as large as a ten-cent-piece, on the posterior wall directly back of the uvula. There

was also a small ulcer in the larynx in the interarytenoid space. There was dulness at the right apex, with bronchial breathing. The pulmonary and laryngeal tuberculosis was first present in this case so that the development of the disease in the pharynx could be watched from the beginning. There was first some slight redness of the mucous membrane with several small grayish nodules; these, in the course of another week or so, broke down, forming the ulcer which had all the characteristic appearances. After continued applications alternately of lactic acid and orthoform in olive-oil, the pharyngeal ulcer got entirely well. The patient is now in Denver, where she is doing very well indeed.

A bacteriologic diagnosis was made in both cases.

The ulceration in the pharynx and particularly of the tongue sometimes extends quite deeply into the muscles of these parts. This has been demonstrated by Beale¹⁶.

If the cases above mentioned, which represent a considerable number of those reported during the past five years, are considered, it seems evident that tuberculosis of the pharynx is after all not so very rare. I quite agree with Shurley, however, that pure tuberculous conditions of the pharynx unassociated with other affections, are very rare. In fact, Shurley has made the statement, that he has not seen cases of tuberculosis of the pharynx except in mixed infection. While the diagnosis can usually be made by the appearance of the ulcers and the bacteriologic examination, in cases of mixed infection, it is at times very difficult. This is so in the cases of mixed tuberculous and syphilitic infection. It has been shown too by Naegeli²⁷, that localized tuberculosis may take on a carcinomatous character, the tuberculosis usually being the older process. On the other hand, tubercle bacilli may enter a carcinomatous ulcer. Loeb found in 111 cases of carcinoma, that in 31 it was combined with tuberculosis. Warthin³⁷ has reported a combination of sarcoma and tuberculosis occurring in a wart of the skin, has twice seen tuberculosis and carcinoma combined in the mammary gland, and in one case this combination occurred in the axillary glands.

Except in these combined cases, the differential diagnosis between pharyngeal tuberculosis and beginning carcinoma should not present any particular difficulties. The only other forms which, according to Mikulicz³⁸, may have diagnostic difficulties, are the severe ulcerations occurring in cases of advanced phthisis, and the very rare solitary tubercular ulcer usually situated only on the posterior pharyngeal wall. Another form of tuberculosis of the pharynx or nasopharynx, which is extremely difficult to diagnose clinically, is the tuberculous tumor. Hajek⁴¹ has reported such a case which was at the time the first one on record. Then the type of acute miliary tuberculosis in children may present difficulties in diagnosis. A positive diagnosis of pharyngeal tuberculosis ought not to be made without a bacteriologic examination, and without first trying potassium iodid. It is really surprising how many ulcerative throat conditions, even with positive evidence of pulmonary tuberculosis, and which clinically present all the appearances of tuberculosis, get well when potassium iodid is administered. I have had a number of such cases.

Since the publication of Dieulafoy's experiments, in which he called attention to tuberculous infection of the tonsils and the lymphoid tissue of the nasopharynx, much greater interest has been taken in the subject. Dieulafoy¹⁸ inoculated portions of extirpated tonsils into 61 guinea-pigs, 8 of which became tuberculous. Guinea-

pigs were also inoculated with adenoid tissue from 35 cases, and 7 developed tuberculous processes. He distinguishes three stages: 1. Latent tuberculosis, in which the bacillus causes a multiplication of phagocytes and enlargement of the tonsils; this process, by development of fibrous tissue in the tonsils, may not extend, but often does. 2. The submaxillary and cervical lymphatic glands are invaded, and from these there may be extension through the lymphatics, until the thoracic duct or right lymphatic duct is reached, whence the bacillus is carried to the right side of the heart. 3. From the heart the process may finally reach the lung.

Wright²⁴ has questioned the accuracy of Dieulafoy's experiments. His investigations, made in the same way, were entirely negative. Guinea-pigs were inoculated with tonsillar and adenoid tissue from 12 unselected cases, which had before been histologically and bacteriologically examined. The experiments of W. H. Park and those of Botey were also negative. Lermoyez and Macaigne³³ have reported a case of primary tuberculosis of the tonsils of a young girl. There was no tuberculosis of the lungs; microscopic examination of the extirpated tonsils showed separate and confluent necrotic tubercles with giant cells and some bacilli. Tusseau¹⁰ has reported 3 cases of tuberculosis of the tonsils. Lermoyez, in 32 cases of adenoids found tuberculosis in 2. Brindel, in 64 cases, found tuberculosis 8 times in the adenoid tissue that was removed. Gottstein⁴⁰, in 33 cases, found it 4 times. Fischer and Pluder¹⁹, in 32 cases, found tuberculosis 5 times; twenty-eight of these cases were children and 4 adolescents and adults; only 10 of the children were scrofulous; not one of them had general tuberculosis. The diagnosis was made histologically. Latent tubercles were found in the mucous membrane of the adenoids. A few bacilli were present in the diseased part, never in the epithelium nor healthy lymph follicles. Distinct caseation was found in half of the cases. Walsham³² examined the tonsils of 34 tuberculous subjects, on all of whom autopsies were held. During life, with two exceptions, there had been no symptoms of tuberculosis of the tonsils. In 20 cases, the tonsils were found to be tuberculous. Broca, on the other hand, examined the extirpated adenoid tissue from 100 cases, without finding evidence of tuberculosis in a single case. For some time, tonsils and adenoids removed in operations in private and hospital practice have been carefully examined histologically and bacteriologically, at the Bender Laboratory, by Dr. George Blumer. Of these, 23 were cases of adenoids and 12 of enlarged tonsils. These 35 specimens were all from unselected cases, children between the ages of 4 and 15 years. In each case a careful physical examination was made of the patient, particularly for evidences of pulmonary tuberculosis. None of the 23 adenoid cases had any tuberculosis that could be detected, and 11 of the tonsil cases were also free from general tuberculosis. In nearly all of these cases, however, the cervical lymphatic glands were markedly enlarged, and a number of the children had had operations for suppurating glands in the neck. On histologic examination, none of the hypertrophied lymphoid tissue removed from the nasopharynx was found to be tuberculous, but of the 12 tonsils, two were found to be tuberculous. In one case, the tuberculosis of the tonsil was probably primary. The tonsil of the one case (Specimen 51 of the report) was from a girl 6 years old, a patient in the Child's Hospital, who had had an operation for tubercular arthritis of the knee. In the second case (Specimen 52), a girl 5 years old, there

was absolutely no evidence, on careful physical examination, of tuberculosis anywhere else, so that the tuberculosis of the tonsil must be considered the primary condition.

Following is the report of the examination of the tonsils, at the Bender Hygienic Laboratory, Albany, N. Y., May 22, 1899.

Specimen 51.—The tonsillar substance is, for the most part, perfectly normal in appearance. At one or two points, however, there are areas of cells which contract very sharply with the tonsillar substance, on account of the lighter stain which they take. These areas consist of sharply circumscribed cellular nodules made up mostly of oval or irregular cells of an epithelioid type; and of small round lymphoid cells. There are also present, in some of them, large multinucleated cells, in some of which the nuclei have a peripheral arrangement. The centers of some of the nodules are entirely necrotic, taking a pink stain, containing a good many nuclear fragments, and into these necrotic areas a good many typical polymorphonuclear leucocytes have wandered. A few tubercle bacilli were found after appropriate staining.

Specimen 52.—The greater portion of the tonsil is normal, but at a number of places there can be seen, in the tonsillar substance, sharply circumscribed cellular nodules, made up, for the most part, of cells of an epithelioid type, but also containing small round lymphoid cells, and typical giant cells of the Langhan's type. The majority of these nodules are very small and show no signs of degeneration, but in one or two of the larger ones, beginning central necrosis can be made out. In this specimen also a few tubercle bacilli were found after appropriate staining.

GEORGE BLUMER, Pathologist.

Not enough consideration has been given to the fact that the tonsils are of considerable etiologic importance, as perhaps *often* the primary seat of infection in general tuberculosis. As mentioned before, Dieulafoy has shown how the tuberculosis may extend from the tonsils to the lungs.

Winckler¹⁴ found that in scrofulous eye affections, 50 per cent. had diseases of the nose or nasopharynx. He examines all eye cases for adenoids. If it is granted that scrofulous lesions are due to the development of the bacillus tuberculosis, the importance of diseased tonsils as a cause of scrofula is readily seen. It is a question whether hypertrophied tonsils and adenoids are not frequent causes of scrofula. As Baginski³⁶ has said, "subjects of the lymphatic constitution are only selected cases of the most outspoken form of scrofula."

The bacteria cause an increased hyperplasia of the lymphoid tissue of the nasopharynx and tonsils, and from there the scrofulous process extends by way of the lymph-channels to the glands of the neck, and to the ears and eyes. Certainly children of this lymphatic type are extremely subject to infection. This is frequently shown by their enlarged glands, and the involvement of the lymphatic structures all over the body. We have all seen how wonderfully these children improve when their diseased tonsils and the lymphoid tissue of the nasopharynx are promptly removed, provided there are no tuberculous processes in other parts of the body. If not removed early enough, they are a constant menace to the general health. I do not think there is any doubt, even though our own examinations of adenoids were negative, that if all extirpated tonsils and adenoids were subjected to a very careful histologic and bacteriologic examination, tuberculous conditions would be frequently found. That other general infections, as well, have their origin in the tonsils, has been pointed out by Jessen³⁴. He has reported four cases to prove this: a case of severe general infection following disease of the tonsils, and a second case of fatal pyemia, the result of tonsillar abscess. The third case was one of pneumonia with pericarditis, pleuritis and nephritis, following

a streptococcus angina. In the fourth case there was a fatal double pneumonia with its origin in the tonsils. The author states that without a bacteriologic examination it would be natural to attribute some of these cases to influenza. He also believes that these cases are not rare; that many of the septicemias, and the streptococcus and staphylococcus pneumonias, gain entrance into the system through the tonsils. Richardiere and Hanot have reported fatal cases of lymphangitis, pleurisy and sepsis, following non-phlegmonous inflammation of the tonsils. Hodenpyl has claimed that bacteria could not enter the tonsils unless there was a "loosened" epithelium. This, however, is always the condition of the epithelium in the crypts of the tonsils. Whether the scarlatinal angina is not the point of entrance for the scarlet fever is still an open question. Abrahams, Trousseau and others, have reported cases of rheumatism following inflammation of the tonsils.

In conclusion I would express my thanks to Dr. Blumer for his valuable aid.

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DISCUSSION.

DR. ROBERT LEVY, Denver, Colo.—I regret that I was not here to hear all of the Doctor's paper, for it is one of exceeding

interest to those of us living in the section of country I do, and seeing, as we do, a great many cases of tuberculosis and not a few cases of tuberculosis of the pharynx. A few years ago I reported seventeen cases of laryngo-pharyngeal tuberculosis and since then I have records of a number of additional cases. While potassium iodid often will clear up ulceration in the pharynx, those ulcerations in my experience have not been very suggestive of tuberculosis of the pharynx, neither in their own clinical appearance nor in the clinical appearance of the patient. In tuberculosis of the pharynx the general condition is usually quite distinctly tubercular. In laryngeal tuberculosis the diagnosis often is more difficult. I will not say there are not exceptions, but in a general way those cases which have cleared up under potassium iodid have given a history sufficiently suggestive to lead us up to the administration of potassium iodid with considerable certainty. As to the source and the mode of infection, in my hospital experience I was struck with the presence of acute pharyngitis in cases which afterward developed pharyngeal tuberculosis. In reading the works of a number of men as to the mode of infection I was particularly struck with the fact that frequently the infection is local and is the result of a destruction of the epithelial covering, whereby an opening is made for the entrance of the specific poison. I will not say that many cases do not occur through lymphatic infection, but I do believe that a local inflammation may exist which will assist in admitting the infection. As a rule tuberculosis of the pharynx occurs in advanced cases of pulmonary tuberculosis, and rarely is it found that tuberculosis of the pharynx occurs early in the disease.

DR. EMIL MAYER, New York City—The Chair would ask the reader of the paper to state, if he can, the final outcome of the case where he found tubercle bacilli where the disease had not been suspected. And also, I failed to notice whether he said anything at all about the diagnosis clinically between tuberculosis of the pharynx and lupus.

DR. E. FLETCHER INGALS, Chicago—I was interested especially in the views expressed in this paper as to the mode of infection of the pharynx. If the infection results from the sputum, we ought to have tuberculosis of the pharynx much more frequently than we do in tuberculosis of the lungs, therefore it seems that the infection must usually be through the blood-vessels rather than from the surface of the pharyngeal mucous membrane. A form of sore throat, known as serofolous, that causes large and comparatively deep ulcers, sometimes occurs, in which we do not know the exact etiology. It has been thought that these cases are generally the result of an inherited mixed infection of tuberculosis and syphilis. At any rate the ulcer is likely to occur in individuals whose parents have had one or both of these diseases. These cases occur in comparatively young children; they do not present the appearance that we commonly see in tuberculosis of the pharynx, nor that of the deep ulcer of syphilis. As a rule, these ulcers have beveled edges and they are about midway in depth between the tubercular and deep syphilitic ulcers. In such cases it is difficult to determine whether there is a tubercular process or not for we are not likely to discover the tubercle bacilli, and I think they have been sufficiently studied. I have seen a few of these cases and have found that they generally yield to the treatment that I commonly employ in tertiary syphilitic ulcerations of the pharynx. This consists of the tincture of iodine in full strength, carefully applied until the surface has a dry brown glazed appearance. These applications are made daily for about ten days and then less frequently, usually for about two weeks until the ulcer is healed. At the same time the patient is given moderate doses of iodids, and nux vomica or other tonics as indicated.

DR. C. F. THEISEN, Albany, N. Y.—In reply to Dr. Mayer's query, I would say that in the cases I have seen in private practice, I was only able to make out these two positive cases of tuberculosis of the pharynx. In all the ulcerative cases the bacteriologic examination is made. In most such cases the streptococcus is found and I have no doubt it is the streptococcus that causes the rapid ulceration and destruction. But in all the other cases (except the two I reported), iodid of potassium cleared up the pharyngeal ulceration. Dr. Mayer asked about the child in which the condition was only found on histologic examination. The examination showed the necrotic tubercles with giant cells and tubercle bacilli, a typical microscopic picture of tuberculosis. It was impossible to tell whether the other case was primary or not. I did not go into the diagnosis of tuberculosis in detail, because I had to handle the subject in a short space of time. I think there is no doubt the diagnosis is easy between tuberculosis and lupus. The bacteriologic examination in these cases does not always clear up the case.