

GENERAL STAFF MEETING
UNIVERSITY HOSPITALS
UNIVERSITY OF MINNESOTA

CONTENTS

	PAGE
I. 50TH ANNIVERSARY	332
II. FUNERAL DIRECTORS AND EMBALMERS	332 - 333
III. STAPHYLOCOCCIC INFECTION	
GENERAL STATEMENT	333 - 334
IV. CASE REPORT	
CARBUNCLE ON NECK. MULTIPLE LUNG ABSCESSSES Path. Shimonek	334 - 335
V. CASE REPORT	
SKIN ABSCESSSES, METASTASES TO LIVER Path. Pearson	335 - 339
VI. ABSTRACTS	
STAPHYLOCOCCIC INFECTIONS Abstr. Koucky	339 - 347

I. 50TH ANNIVERSARY

Robert Koch was born in Klausthal, Province of Hanover, Germany, in 1843. The third child in a family of thirteen (eleven sons and two daughters), he grew manly and independent early in life. As a youth he explored the valleys and mountains near his home and was keenly interested in zoological and geological collections. The family funds were limited and while he was receiving a good schooling the prospects for the future did not look bright (probably business). At the psychological moment, extra funds materialized, and he was allowed to go to the university to pursue his beloved science. His plans for the future were definite--after graduation in medicine, he would be a ship surgeon. His marks were good and in his third year he wrote a prize thesis on anatomy. Through strict economy, he succeeded in graduating in medicine.

1866 he finished, fell in love with Emmy Fraatz and they were married. Her idea of married life differed slightly from his and so they compromised by settling down to the practice of medicine. They moved from town to town for several years, eking out a meager living. We now find them preparing for the celebration of his twenty-eighth birthday in Wollstein in East Prussia. Things are going a little better and the thrifty wife has saved a little money on the side. For his birthday surprise, she has purchased a real microscope to replace the magnifying lens he has used up to this time.

They can hardly wait to change the little office around. A curtain is placed across one end of the consulting room, a home made incubator heated by an oil lamp is put into place and under the stimulation of a microbe conscious world he starts to work. Quickly he found the cause of anthrax. He made animals sick by injecting germs into them (mice, rabbits, sheep and cows). Everything was improvised but always careful notes were kept. As the result of his anthrax work, he was offered a position in the Imperial Health Bureau in Berlin in 1880. He quickly left his practice behind and moved his family and meager equipment to the institute. Happiness greater than any he imagined

ever existed was now his. He devised hard gelatine plates and studied surface cultures and in this way found the tubercle bacillus. In 1882, March 24th, fifty years ago last Thursday, he announced his find at the meeting of the Berlin Pathological Society. It is interesting to note that this came 6 years after he learned the cause of anthrax. There was little argument about his discovery. Every step was traced before the audience so that there was little more to be said, the result silencing old Rudolf Virchow for the first time in his life. The original report is to be found in the Berliner Klinische Wochenschrift and two years later in his book "The Etiology of Tuberculosis".

In addition to these contributions, he established his postulates, developed tuberculin, became a world figure, inspired thousands to work on this disease before his death, May 27, 1910. While he never saw his boyish dream fulfilled, his explorations in his own office and later in the institute were epoch making in disease control. (National Tuberculous Association, March 1932).

II. FUNERAL DIRECTORS AND EMBALMERS

Convened for their short course last week. Present were the students of the course offered by the Extension Division (two quarters, later to be three) and members of the State Association. The bulletin used at that time is available for you today. The first part is concerned with an attempt to clearly differentiate between communicable and non-communicable diseases (a difficult question for laymen). Detailed advice as to how to stop communicable disease spread is offered. The second part deals with the question of the autopsy. Read this over with care and you will notice that from their standpoint and ours there is agreement but cooperation is necessary. Pseudo-scientific non-conformists and others find much material for scoffing in the F. D. and E. course at Minnesota. The suggestions made in the A.M.A. editorial sound very much like something which was worked out at Minnesota twenty-four years ago. This

course referred to as the higher education at Minnesota by the Mercury (Americana Column) is apparently living up to its name. A profession is what its members make it. It may be defined as an occupation that involves a liberal education with mental rather than manual labor, also that which is professed a declaration; also, a pretense. It was from this viewpoint (declaration) that the subject of autopsies is approached. If medical men and Funeral Directors and Embalmers alike approached this subject from a professional viewpoint (more than materialistic gain), the question is solved. Unique in Minnesota's course are studies in anatomy, bacteriology of molds, investigation of the claims of wood and metal casket makers, plastic restorative procedures by the Art Department, pathology, public health, chemistry, psychology, and business methods. The old days of exorbitant bills for caskets are gone, now we have itemized service charges with sliding scales for different purses. It would be interesting to speculate how far we could have gone in our autopsy work without the supervision of the training of these men for the past twenty-four years.

III. STAPHYLOCOCCIC INFECTION

General Statement.

One has only to review the indices of medical literature to realize how much interest is manifest today in "Clinical Bacteriology." The titles listed under "Staphylococci" are not only numerous but growing very rapidly in number.

The Staphylococci (Micrococci)

Family: Coccaceae Sopf.

Tribe: Micrococceae.

The power to incite purulent and seropurulent inflammations and localized abscesses in man and animals is possessed by a large variety of pathogenic bacteria. The large majority of acute and subacute purulent processes, however, are caused by the members of a well-defined group of bacteria spoken of as the pyogenic cocci. Among these, preeminent in importance, are the staphylococci or micrococci.

The group of staphylococci--so named from their growth in irregular, grape-like clusters--is made up of several members, by far the most important of which, pathologically, is the Staphylococcus pyogenes aureus. Examined in smears from cultures or pus, the staphylococci may appear as single individuals, in pairs, or, most frequently, in irregular grape-like clusters. Occasionally, short chains of three or four may be seen. In very young cultures in fluid media, the diplococcus form may predominate.

Staphylococci grow readily upon the usual laboratory media. Differentiation between the various members of the staphylococcus group is based largely upon the formation of pigments. These pigments seem to be species characteristics. Thus, Staphylococcus pyogenes aureus is recognized primarily by its production of a yellowish-brown pigment. Although not spore formers, staphylococci are more resistant to heat than many other purely vegetative forms.

Separate strains of Staphylococcus pyogenes aureus show wide variations in relative virulence. The most highly virulent are usually those recently isolated from human suppurative lesions, but no definite rule can be formulated in this respect. Animals on the whole are less susceptible to staphylococcus than is man. Among the ordinary laboratory animals, rabbits are most susceptible to this microorganism. Intravenous inoculation of doses of 0.5 c.c., or more, of fresh broth cultures of virulent staphylococci usually leads to pyemia with the production of secondary abscesses, located chiefly in the kidneys and the heart and voluntary muscles, but not infrequently in other organs as well. Intravenous injections of virulent staphylococci preceded by injury to a bone is often followed by the development of osteomyelitis. Mechanical or chemical injury of the heart valves preceding intravascular staphylococcus inoculation may result in localization of the infection on or about the heart valves, leading to "malignant endocarditis."

Staphylococcus lesions of the skin are characteristic in that, after an induration, there occurs a central softening with the formation of liquid pus. It is an important observation, confirmed by much experience, that if incision is practiced in the indurated and inflamed tissue before the process has come to a central head, infection is usually spread, perhaps by the opening of adjacent lymphatics. Therefore, there is much judgment required in treating even these simple lesions. Faulty surgical interference may easily convert a simple furuncle into a dangerous carbuncle.

The dead bodies of staphylococci injected into animals may occasionally give rise to abscess formation, and, if in sufficient quantity, may cause death. Hemolysins are produced by Staphylococcus aureus, and, to a lesser degree, by Staphylococcus albus. The pleural exudate of rabbits following the injection of virulent staphylococci, shows marked evidences of leukocyte destruction. The substance causing the death and partial solution of the leukocytes is a soluble toxin formed by the staphylococcus, not only in vivo, but in vitro as well. There is also an exotoxin produced by certain strains of Staphylococcus aureus.

Active immunization of human beings suffering from staphylococcus infections has been extensively practiced by Wright, in connection with his work on opsonins. There can be no question about the fact that the opsonic substances in the blood are increased by the injection of dead staphylococci. The procedure is of therapeutic value in subacute and chronic cases.

Passive immunization with antistaphylococcus sera has not been a therapeutic success.

(Textbook of Bacteriology, by Hans Zinsser, Appleton & Co., Sixth Edition, 1929:318-328).

IV. CASE REPORT

CARBUNCLE ON NECK. MULTIPLE LUNG ABSCESSSES.

Path. Shimonek.

The case is that of a white male, 54 years of age, admitted to the University Hospitals 6-25-31 and died

6-30-31 (5 days).

Local Infection

6-4-31 - Developed red, painful, indurated area on back of neck. Spread soon after its appearance. Incised by a local physician.

Carbuncle

6-25-31 - Admitted to University Hospitals. Physical examination: Patient is a poorly nourished, well-developed, white male, appearing older than 54 years of age, lying in bed in gross discomfort. Holds his head slightly flexed over chest. Has dyspnea. Color pale. On the whole posterior aspect of the neck extending to the level of the seventh cervical spine, laterally to both mastoid regions (more so on left), and to the level of the occipital protuberance, superiorly, there is marked swelling and brawny induration of the skin and numerous, small, superficial abscesses (few are draining). Few enlarged nodes. No other positive physical findings. Temperature 102. Pulse 125. Respirations 20. Progress: Hot packs applied to the neck. Considerable bloody drainage. Wbc. 23,000.

Incised.

6-26-31 - Under general anesthesia, six vertical incisions were made in the back of the neck. A large amount of sanguino-purulent material is obtained. The bleeding is well controlled. Pulse became weak following operation. 4,000 cc. intravenous saline given within 24 hours. Hot packs applied. Respirations 16, temperature 102.6, and pulse 115 after operation. At 10:10 A.M. and 1 P.M. - morphine sulphate gr. 1/4 (H).

Toxic.

6-27-31 - Stuporous in morning. Slept well after hypodermic. Takes fluids well. Talks irrationally at times. At 2:00 and 11:00 A.M. and 9:30 P.M. - codeine sulphate gr. 1 (H) was given. Hot packs applied. Temperature 103. Pulse 125. Respirations 24.

Parotitis.

6-28-31 - Takes foods well. Irrational. Responds poorly. Moderate drainage.

There is definite swelling of right side of face associated with reddening and swelling of buccal orifice of right parotid duct. Impression: Parotitis, right. Ordered hot packs to this region continuously. Temperature 102.8. Respirations 20. Pulse 135.

Worse.

6-29-31 - Patient is becoming progressively worse. Irrational. Not taking fluids well. Color poor. Incontinent. Catheterized, 700 cc. urine obtained. Swelling on side of face appears to be about the same. Very much weaker.

Temperature 105. Pulse 158. Respirations 24. Codeine given.

Exitus (26 days).

6-30-31 - Now comatose. Weak, thready pulse. Respirations shallow. Eyes fixed. No improvement. 7 A.M. - catheterized, 850 cc. urine obtained.

Temperature 107 (R). Caffeine sodium benzoate at 5:20, 5:35, 6:05, and 8:05 A.M. gr. 7-1/2, each. 8:40 A.M. - expired.

Autopsy.

The body is that of a fairly well-developed, and nourished, white male, 54 years of age, measuring 161 cm. in length, and weighing approximately 140#. Rigor is present. Hypostasis is purplish and posterior. There is no edema, cyanosis or jaundice. The pupils measure 4 mm. in diameter. There are multiple, longitudinal incisions on the back of the neck, 10 to 12 cm. in length. There is a draining, indurated area covering the entire posterior part of the neck.

The Peritoneal Cavity is opened and found to be normal in appearance. There is no fluid present. There is a moderate degree of distension of intestines.

The Pleural Cavities contain about 100 cc. of fibrino-purulent material. The Pericardial Sac is smooth, glistening and contains about 35 cc. of fluid.

The Heart weighs 250 Gm. The valves are normal. The coronaries show a small amount of sclerosis but no obstruction to the lumina. The Root of the Aorta shows a moderate amount of arteriosclerosis.

The Right Lung weighs 725 Gm., the Left 630 Gm. There is a fibrinous exudate over the visceral pleura on both sides. Both bases are somewhat congested

and contain no air. The surfaces of both lungs show multiple, discreet and confluent abscesses. The upper lobes are somewhat emphysematous. The bronchi show some hemorrhagic bronchitis (bronchopneumonia?), an earlier process on the left than the right.

The Liver weighs 1500 Gm. and is normal in appearance.

The Gall-bladder is somewhat contracted.

The Gastro-Intestinal Tract shows slight distension.

The Pancreas weighs 90 Gm. and is normal.

The Adrenals are normal.

The Kidneys each weigh 175 Gm. Both are normal in appearance.

The Bladder is somewhat distended and filled with urine.

The Genital Organs are normal.

The Aorta shows a moderate degree of arteriosclerosis.

Diagnoses:

1. Carbuncle of neck.
2. Incisions (Multiple).
3. Bronchopneumonia, acute.
4. Multiple lung abscesses.
5. Possible septicemia.
6. Slight coronary sclerosis.
7. Multiple puncture wounds.
8. Fibro-purulent pleuritis.
9. Acute parotitis.

Blood Culture.

Staphylococci present.

Note: No glycosuria. Notes indicate poor general physical condition for some time. No definite history of chills. Past history of furuncle several years ago (site not stated). Incision by endotherm. Later history reveals lesion started as a pimple and was treated at home (incised 6 days before admission). Case illustrates many points of staphylococcic infection.

V. CASE REPORT

SKIN ABSCESSSES, METASTASES TO LIVER.
Path. Pearson.

The case is that of a white male, 17-1/2 months of age, admitted to the University Hospitals 8-23-31 and died 11-16-31 (85 days).

Skin Infection (10 months ago).

11- -30 - Developed multiple abscesses all over his body. He was treated at an orphanage with autogenous vaccines and ultra-violet light but this did not clear up the condition. Later developed bilateral cervical adenitis which was incised and drained.

Liver Abscess (2 months ago).

6- -31 - Developed a liver abscess which was opened and drained but failed to heal. Continuous fever all of this time which went up to 104 at times.

Past History: Illegitimate child, normal birth history, and well up until three months of age.

Physical Examination.

8-23-31 - Admitted to University Hospitals. Physical Examination shows multiple abscesses with crusting and scaling over the head: excoriations about the nose, face, and mouth; Anterior fontanelle open. Nose - slight serous discharge. Mouth - tonsils markedly enlarged and reddened. Neck - bilateral cervical adenopathy; old scar present (draining) and in cervical region.

Abdomen - high right rectus incision which is still draining a moderate amount; spleen palpable but not definitely enlarged. Right axillary adenopathy present. Progress: Put on general diet. T 99. P 100. R 22.

Laboratory.

8-24-31 - Fairly comfortable. X-ray of chest - There is some widening of the superior mediastinum, appearance suggesting an enlarged thymus. The possibility of this being enlarged glands must be borne in mind, however. There is upward displacement of the medial portion of the right diaphragm, the appearance suggesting the possibility of a mass below displacing it upward. There is no evidence of parenchymal pathology. Conclusions: Probable enlarged thymus. Possible enlarged mediastinal glands. Possible sub-diaphragmatic mass, right. Blood - Hb. 45%, rbc's 3,630,000, wbc's 14,650, L 50%, M 4%, E 1%, Pmn's 45%, marked hypochromasia. Mantoux test applied, right forearm. Wassermann - State Board and Larson - negative. Urine - negative. T 99.2. P 132. R 40.

Treatment Started.

9-10-31 - Iron and ammonium citrate gr. x, given four times daily. Heat applied to right side of neck. Abscess on right side of neck incised and rubber drains inserted. T 99. P 100. R. 20. Mantoux test - negative.

Smear from incision - very occasional gram negative cocci and bacilli. Schick test - negative. Smear from incision on abdomen - staphylococcus and gram positive bacilli. Blood - Hb. 52%, Burrough's packs applied to lesion three times daily.

9-17-31 - Burrough's packs applied to lesion. Abscess on right side of neck incised. T. to 100.

X-ray.

10-9-31 - X-ray of chest - The right diaphragm is markedly higher than normal. This may be due to subphrenic lesion pushing it up or possibly something at the base of the lung pulling it up. There is no definite evidence of pathology in the lung itself. There is a large mass in the right superior mediastinum (a mass of enlarged glands). Suggest re-examination. Urine - negative. Blood - Wbc's 23,650. Blood culture shows staphylococci.

Perinephritic Abscess?

10-20-31 - X-ray - K.U.B. - There is some cloudiness in the region of the right kidney. The outline of neither kidney could be made out very well, although the left is better seen than the right. The right psoas muscle is not well shown. There is a distinct scoliosis of the spine with the convexity to the right. These findings combined with the high right diaphragm make the possibility of perinephritic abscess fairly strong. Conclusions: Perinephritic abscess, right. Sub-diaphragmatic abscess, probable, right. Iron ammonium citrate gr. x four times daily. Oscadol tablets ii, three times daily. T. to 104. P. 122. R. normal. Urine - negative.

10-21-31 - Aspiration of perinephritic area with no results. T. 100. P. 110. R. normal.

X-ray.

10-28-31 - Postules on nose painted with 20% silver nitrate. X-ray of

chest - The right diaphragm is still distinctly higher than normal, although slightly irregular. There is no evidence of fluid in the right pleural cavity, but some thickening of the pleura is present. The shadow in the right superior mediastinum is still about the same. Urine - 1+ albumen. Blood - Hb. 44%, Wbc's 32,350, Eosin's 74%, L. 1%, M. 5%. T. 104.2. P. 152. R. 35.

Chill.

10-31-31 - Iron ammonium citrate gr. v, four times daily. Oscadol tablets ii, three times daily. Patient has a chill. Cyanosis of lips and finger nails noted at this time. Pulse weak. Body warm. External heat applied. T. 104. P. 92. R. 48. One-half hour later, T. 104.

Lung Change?

11-2-31 - Given chloral hydrate gr. xv (R). X-ray of chest - abdomen - The right diaphragm is still high. There is now some evidence of pulmonary congestion and possibly secondary involvement of the lungs. The appearance still suggests somewhat a subphrenic abscess. T. up to 103.2. P. to 130. R. 35.

Operation.

11-3-31 - Right posterior chest aspirated, 2 c.c. pus obtained. Patient sent to operating room and anesthetized with drop ether. Preoperative diagnosis: Subdiaphragmatic abscess, right. Note: This boy has been running a very septic type of temperature for a considerable length of time, has had multiple cutaneous staphylococcic boils and furuncles, showed a high right diaphragm and a heart displaced to the left. Aspiration of the perinephritic space about ten days ago revealed nothing. Aspiration today with a large needle between the ninth and tenth ribs posteriorly was rewarded with about 4 c.c. of very thick tenacious pus which on smear showed pus cells and staphylococci. Procedure: An incision was made over the twelfth rib on the right posteriorly, down to the rib. Periosteum was reflected from the rib and the rib resected. Incision through the underlying fascia revealed fatty tissue. Exploration with the finger dissected the peritoneum forward. The entire perinephritic space was explored. No pus was encountered. The diaphragm was followed upward to its dome, and no

pus was encountered. This incision was then closed. An incision made over the tenth rib, a portion of this rib being resected posteriorly, and the pleural cavity was opened. Smooth serous membrane was seen in the depths of the wound. No pus was encountered. This was closed adequately. A strip of iodoform gauze was placed in the pleura, and the skin was sutured over the iodoform gauze. It is our impression that the abscess is probably subdiaphragmatic, but well encapsulated and in four or five days when adhesions have formed between the distal and parietal pleura, a second exploration will be made for drainage of the abscess. Returned from the operating room in good condition. T. to 104. Pulse to 186. R. to 40. Smear from aspiration - pus cells and staphylococci present.

X-ray.

11-4-31 - X-ray of Chest - The right diaphragm is still somewhat high. The irregular densities in the right lung are again shown. Lateral view shows no definite local area of encapsulation. Respirations are somewhat rapid and shallow. T. at 7 A.M. is 95. External heat applied.

Transfusion.

11-5-31 - 125 cc. citrated blood given by jugular transfusion. T. 104. P. to 150. R. to 40.

11-7-31 - 175 cc. citrated blood given by transfusion. Urine - negative. Blood - Hb. 43%, wbc's 8,350.

Hydropneumothorax.

11-10-31 - Iron ammonium citrate, gr. x, four times daily. Fluids forced. Copper sulphate gr. 1/4, four times daily. Cod liver oil i dram, orange juice 1 oz., two times daily. Oscadol ii tablets, three times daily. X-ray of chest - There is a large amount of fluid and air in the right pleural cavity. The diaphragm is now pushed down and the mediastinum is displaced to the left. A mediastinal hernia is present with extrusion of air into the left pleural cavity. Conclusion: Hydropneumothorax, right.

Coughing.

11-14-31 - Spells of coughing. Com-

plains of pain on coughing. Dressings changed. There is a large amount of serous drainage and two sutures are broken. Seems to be breathing through the wound. Wound necrotic. Adhesive tape placed over the incision. T. 104. Respirations rapid.

Exitus.

11-16-31 - Quite restless. Chloral hydrate gr. xv. Codeine sulphate gr. 1/4 for pain. Sutures removed. Operative incision repacked with iodoform packing. Dry dressings applied. Seems weaker. Very listless. 500 cc. 5% glucose given subcutaneously. 9 P.M. - very cyanotic. Breathing very labored. Pulse is weak. 9:40 P.M. - patient expired.

Autopsy.

The body is that of a fairly well-developed and poorly-nourished white, male, child, 17-1/2 months of age, measuring 80 cm. crown-heel length and 57 cm. crown-rump length, and weighing approximately 19 lbs. Rigor is present. Hypostasis is purplish and posterior. There is no edema but quite marked cyanosis of the lips and fingernails and about 2+ jaundice. There is also some jaundice of the sclera. There are unhealed, infected wounds on the lateral and posterior aspects of the right chest and abdomen, each measuring 9 cm. in length; one in the proximity of ninth rib which is gaping, somewhat necrotic, and infected; the lower one over the kidney region is healed and seems alright. There is an old, healed scar about 2 cm. diameter in the right upper quadrant of the abdomen. The abdomen is very markedly distended and tympanitic. There are numerous old furuncle residues.

Upon opening the Peritoneal Cavity it is found that all of the intestine, including the large and small, are markedly distended. The appendix is subcecal and free.

The Left Pleural Cavity is normal but in the Right, the pleura of the lung is covered by a shaggy, fibrinous exudate. The Pericardial Sac contains a minimal amount of fluid.

The Heart weighs 75 grams. The valve edges are free and normal. The chambers are normal. The pericardium shows no evidence of infection. The Root of the Aorta and coronaries are normal.

Each of the Lungs weigh 125 grams. The right lung although covered by this shaggy, fibrino-pleuritis, on cut section, shows very little evidence of intrinsic change. There is some congestion at the base of the right lung but no definite pneumonia. The left lung is quite normal and shows no particular evidence of disease.

The Spleen weighs 150 grams. The capsule is grayish and somewhat wrinkled. The spleen is firm and on cut section, the pulp is deep red and firm. Gross change suggests amyloid. Test negative.

The Liver weighs 750 grams. It is very light yellow in appearance and on the surface shows numerous red areas which are interpreted as degeneration of liver tissue. The diaphragm is explored very carefully and it is found that there is no free pus under the diaphragm. One can see abscesses through the capsule of the liver. Upon opening the liver, several abscesses are found; a very large one directly under the capsule under the dome of the right diaphragm, measuring about 5 cm. in diameter. They contain a considerable amount of greenish pus. This is taken for culture and shows staphylococcus albus. There are numerous other small abscesses present and around all of these are red areas which are interpreted as regeneration of liver tissue.

The Gall-bladder and ducts are normal.

The Gastro-Intestinal Tract is normal in its entirety.

The Pancreas weighs 40 grams and is normal.

The Adrenals are normal.

Each of the Kidneys weigh 60 grams. They are somewhat cloudy and grayish in appearance. The capsules strip easily, revealing smooth surfaces. There is no evidence of intrinsic disease. Slight hydronephrosis on left.

The Bladder and ureters are normal.

The Liver, Spleen, and Kidneys show a questionable positive test for amyloidosis, grossly.

Diagnoses:

1. Furunculosis (clinical).
2. Liver abscesses.
3. Fatty degeneration of liver.
4. Fibrinous pleuritis, right.
5. Slight hydronephrosis.

6. Recent operative incisions
(and old scars).

7. Slight icterus.

Note: Long (almost a year) low grade (s. albus?) infection of skin with blood stream involvement of liver. Therapeutic failure in spite of repeated attempts to drain liver abscesses.

<u>Organism</u>	<u>Habitat</u>	<u>Lesion</u>
<u>Pityrosporon</u>	Coreum	Dandruff Schorrhoea.
<u>Acne Bacillus</u>	Infundibulum of pitosebac- eous glands	Comedo acne Pustule.
<u>Staphylococcus</u>	Ostium of Follicle	Pustule

VI. ABSTRACTS:

STAPHYLOCOCCIC INFECTIONS.

Path. Koucky.

1. Staphylococcic Infections.

Phemister, D. B., J.A.M.A.
78, 480-486, 1922.

For many years the teeth, tonsils, gallbladder, appendix and sinuses have been stressed as principal foci of infection and the streptococcus has been emphasized as the offending organism. The enthusiasm has been so great that other organisms and other foci have been neglected.

The author urges consideration of staphylococci as offending organisms and lesions of skin such as boils carbuncles, wounds, paronychia, acne pustules, folliculitis, impetigo, exzema dermatitis, etc. as foci of infection.

19 cases of hematogenous staphylococcic infections secondary to skin lesion are presented as proof of this contention.

2. Staphylococcic Infections of the Skin.

Barber, H. W., Guy's Hospital
Reports, 80:153 (Apr.) '30.

Flora of normal skin varies with individuals and their occupation. Normal clean skin is remarkably free from microorganisms. Staphylococcus albus, pityrosporon and acne bacillus are regarded as normal flora. Each has its peculiar habitat and produces typical lesions when no longer saprophytic.

Extension of these lesions or superimposed infection by non-saprophytic organisms produces various lesions. S. aureus is the usual organism invading skin. Listed under S. Aureus infections superimposed upon above lesions are pustules, sycosis cocco-genica, sycosis nachae, acne necrotica, boils, carbuncle, multiple abscesses of infants, hidradenitis, etc.

Distribution of metastatic infection (in present series):

Osteomyelitis . . .	8
Multiple renal abscesses. . .	.2
Perirenal abscess . .	.3
Myositis with abscess . .	4
Arthritis	2

Author believes 90% of osteomyelitis is due to staphylococci. Abscesses of muscles are described as usually occurring in ilio-psoas pectoralis major, thigh or calf muscles (usually multiple).

Staphylococcic metastasis from nasopharynx:- Only in a small number of cases are staphylococci found in mouth, tonsils or teeth. Do not normally grow in these areas. In the nose they are more frequent. In the production of coryza (S. Albus) may be significant factors? (Cecil: Textbook of Medicine, 2nd Ed., Saunders, 1930, lists staphylococci as common organism present in secretions of common cold?) Concerning the presence of staphylococci sinusitis data is insufficient. Lesions of pharynx, teeth and tonsils only occasionally show staphylococci.

The question of staphylococcic sinusitis is being investigated at Minnesota. Present belief is that they are secondary invaders and commonly present.

3. Primary Staphylococcic Infection of Nose, Lips and Face.

Koslin, I. E., Ann. Surg. 94:7-14 (July) '31.

First well described in 1852. Offending organism is staphylococcus aureus. Author presents study of 18 cases.

Age: (12 to 72). Maximum number 40-50. 12 were males, 6 females. 6 died. Duration of illness ranged from 4-20 days. Blood cultures were positive in all fatal cases. (Not stated for entire group.)

Always a history of injury - scratch, picking nose, squeezing pimple, etc. Complaints: swelling, shooting pains, chills, fever and sometimes early coma. Among local signs were edema, redness, exophthalmos, retinal hemorrhages. No case has ever been reported in child under 12.

Death due to involvement of cavernous sinus or meninges. Skin is very thin, subcutaneous tissue, vascular and lax and contains many glands and follicles. Veins are superficial and important structures are near the surface. Lymph vessels are provided with valves and flow is "in one direction, namely toward thoracic duct and great veins and never in retrograde manner." On the other hand the facial vein has no valves and infection by means of thrombosis or emboli. May extend either toward neck or toward cavernous sinus.

Treatment recommended is warm wet dressings, bed rest, no manipulation or incision. Ligation of the facial vein is not recommended because application of the ligature, i.e., manipulation, may discharge portion of thrombus. Note: vein ligation is recommended by others.

4. Staphylococcic Septicemia.

Ryle, J. G., Guy's Hosp. Rep. 80: 137 (Apr.) '30.

Peet, M. M., Pyogenic Infections, Tice, "Practice of Med." V:433,

Prior & Co.

Under this title is included immediate febrile consequences, together with metastatic foci, which from time to time complicate pyogenic skin infections. Mucosal invasions may occur, but this is less certainly established. Gastro-intestinal foci, and even uterine and pulmonary have been mentioned but no definite data confirms this. Fever of short or long duration follows in a considerable proportion of the cases. There is true bacteremia with multiple or solitary metastasis.

Symptomatology:- Period of incubation probably very short (a few hours). Onset is with chill, followed by fever and profuse sweating and pains in the limbs, joints or back. Some cases may have insidious onset. Nausea, vomiting, headache usually absent. Cases of gastro-intestinal origin said to have a more severe onset accompanied by gastrointestinal symptoms and marked neurolytic symptoms.

Cutaneous rash is noted rather frequently, sometimes subcutaneous hemorrhages are so severe that bronzing of the skin occurs. A positive blood culture can be obtained early in majority of the cases. The bacterial count per c.c. of blood may be as high as 100. As disease progresses, profound sepsis is shown by the severe chills, wide variations of temperature, anemia, thready pulse and apathetic facies.

Age:

Staphylococcal fever is a disease more particularly of childhood and young adult life but there are strikingly different liabilities in different age periods. In children, metastasis to bone is usual sequel. In adults osteomyelitis is rare and metastases to the viscera are usual sequel.

Other factors:

Condition is infrequent under conditions of good general conditions of health (see our case). In diabetics it has long been recognized that there is an increased liability to boils and carbuncles. Chronic alcoholism, prolonged infections by other organisms increase incidence. Mixed septicemias

may occur (streptococci, pneumococci, B. pyocyaneus or B. coli.)

Prognosis:

Generalized infection developing from a boil or carbuncle is extremely grave and average mortality is well over 90%. In larger series of cases, the mortality runs from 68 to 75%. Rate is higher in two extremes of life, but under ideal circumstances mortality is no lower than 40%.

In those recovering there is a marked tendency for recurrence and extensive deformities left in viscera should not be forgotten. Ryle says "With every case of septic fever there is a necessary alarm, but too often alarm verges upon panic or despair. Given a good physique, reasonably early diagnosis, a good leucocytosis, and watchful care, the great majority of cases should recover."

Metastasis:

Following secondary changes have been observed:

- Cutaneous and subcutaneous abscesses.
- Abscess of brain, hemorrhages into nerves.
- Purulent meningitis.
- Ulcerations of septum and turbinates.
- Abscess of epiglottis.
- Thyroiditis.
- Pneumonia and lung abscess.
- Empyema.
- Purulent pericarditis.
- Abscess of heart.
- Endocarditis (ulcerative or vegetative).
- Purulent peritonitis.
- Fatty liver; liver abscesses.
- Infarcts and abscesses of spleen.
- Abscesses of small intestine.
- Acute hemorrhagic gastritis and enteritis.
- Perinephritic and renal abscesses.
- Pyelonephritis, cystitis.
- Prostatic abscesses.
- Osteomyelitis.
- Purulent synovitis, bursitis.
- Abscesses of muscle.
- Purulent adenitis, etc.

In a discussion of staphylococcal infections it seems out of place to enter into a detailed account of osteomyelitis. It's bearing on general con-

dition only is considered.

5. Osteomyelitis and Joint Involvement.

Fagge, C. H., Guy's Hosp. Reports: 80:397 (Oct.) '30.

Site:

Any bone may be involved but the upper end of the tibia, upper end of humerus and lower end of femur are most common locations.

Injury:

In all textbooks injury is described as localizing or fixation factor in production of osteomyelitis. It is true that trauma may localize the infection in skin or muscle and Brewer's experiments on the kidney indicate that trauma localizes abscess on traumatized side; however, in the case of bone, doubt is cast upon trauma as a factor in localizing infection. Rarely is injury to soft parts seen in acute osteomyelitis; infection is not seen in fractures, sprains and twists. To the author it appears that distribution of metaphysical capillaries explains site for bone metastasis. No further explanation is given. Age of patients - i.e., the stage of growth in this area, supports view.

Diagnosis: Usual plea for early diagnosis is presented. Usual signs such as fluctuation, swelling, alteration in color of skin must not be anticipated. An early diagnosis of acute osteomyelitis must be made when a child who is obviously ill with appreciable rise of pulse and temperature complains of pain over the metaphysis of a long bone and is unwilling to move part affected; a point of exquisite tenderness over affected bone confirms the diagnosis.

Treatment: Consists of immediate decompression. The author favors relatively small decortication so that blood supply of remaining end of the bone is not compromised.

Post-operative Course: General nature of infection is stressed. Cases continuing to run temperature and showing signs of sepsis, more likely

are suffering from constitutional infection or other sites of metastasis than inadequate decompression. It has been his experience that reoperation at site of first decortication usually results in exacerbation of general symptoms.

Joint Involvement:

"A serous effusion into the adjacent joint frequently accompanies an acute bone infection. While there is no doubt that acute staphylococcic arthritis may be a primary lesion, yet it is well to assume that any such case is secondary to an adjacent bone lesion." A joint effusion primarily serous, may go on into a purulent arthritis by extension from bone. Serous effusions are controlled by aspiration. Purulent arthritis of knee joint secondary to osteomyelitis cannot in the author's opinion be treated conservatively, and provides common indication for amputation. Separation of epithesis: must be considered as confession of failure and means that the diagnosis has been unduly delayed.

6. Staphylococcic Endocarditis.

Thayer, W. S.; Edin. Med. Jour. 34: (Apr.) '31. (Gibson lecture).

Etiological Element in 538 cases of Bacterial Endocarditis.

Streptococci	63%
Pneumococci	15%
Staphylococci	13%
(S. Aureus)	11%
(S. Albus)	2%
Gonococci	7%
Others	2%

Age: Whereas streptococcic endocarditis showed a sharp increase of onset in earlier years (up to 25) the age of onset in staphylococcic form was quite uniform (10-20% in each decade).
Note: Chance involvement.

Duration: In 538 autopsied cases, of less than 2 months duration, 40+ % were due to streptococci and 17% to staphylococci: of those living over 2 months, 75% were due to streptococci, and 3% to staphylococci. Of the staphylococcic endocarditis, 87% lived less than 1 month. Smaller number of staphylococ-

cic endocarditis lesions were engrafted upon a preexisting valvular disease. This is in contrast to striking predilection of streptococci for preexisting lesions.

S. Aureus appears to be preeminently a terminal invader. Commonly, the endocarditis is but an incident in an acute pyemia. The lesions are not dissimilar to those in pneumococcal and gonococcal endocarditis but are not so destructive. Occasionally (13%) a subacute course is present. 80% of the group showed suppurative metastatic lesions elsewhere. The heart muscle showed abscesses (microscopically) in 74%. Pericarditis was present in 23%.

The portal of entry was evident in 70% of cases and was generally an acute septic process. One case followed on extraction of a tooth for an apical abscess. Peridental infection in general, and infected tonsils or sinuses were not as common foci as in the streptococcic endocarditis but were considered the primary foci in a definite number (teeth - 26%, tonsils and sinuses in 13%).

Onset was sudden in 65% of cases with fever, tachycardia, prostration and evidence of severe general infection. Chills and petechiae were uncommon. Anemia in the subacute cases was striking. Diagnosis rarely made during life.

7. Renal Staphylococcic Infection.

Joyce, J. L., Guy's Hosp. Reports 80: (Apr.) '30.

Material: 61 patients with staphylococcal infections were studied; of these 14 had renal lesions.

Historical and Statistical:

Israel - 1890 - described a hematogenous infection of the kidney associated with a furuncle to which he gave the name of "Nierenkarbunkel." (Carbuncle of kidney).

Lilienthal - 1896 - described 2 cases of pyemic abscesses of the kidney with perforation and subsequent perirenal abscess. Pointed out that the urine may be entirely negative.

Brewer - 1911 - produced

abscesses of the kidney by injection of staphylococci into the vein and localized most of these on one side by traumatizing that side.

Richardson - 1915 - 51 cases of perirenal abscess pointed out that staphylococci were most common organism of both cortical and perirenal abscesses. An excellent bibliography is to be found in this paper.

Author's series is divided into 3 groups: 1. acute abscesses confirmed at operation or autopsy; 2. group illustrating grave sequelae; and, 3. those of apparent spontaneous recovery.

In the first group (8) 3 died - all with staphylococcic infection elsewhere. One of the 8 had bilateral abscess. All the group showed both renal and perirenal abscesses.

In the second group (4 cases) which either were undiagnoses in acute stage or remained unhealed after drainage. In these cases, large heavy walled cavities containing kidney stones and remnants of a destroyed kidney were found.

In the third group are 2 cases in which the diagnosis was quite certain but which were treated expectantly (one because of the poor risk) and which recovered. This event is thought to be by no means uncommon.

Etiology: All writers are agreed that the cocci reach the kidney thru the blood. The skin is chief focus but acute osteomyelitis, peridental abscess, maxillary sinusitis and otitis media (1 case each) have been recorded in the literature. Males are affected more often than females. Trauma is significant factor (only one in this series?).

Pathology: Two types are recognized - the pyemic kidney in which the cortex is studded with small abscesses and the other, the acute focal suppurative nephritis or kidney carbuncle. The first is the "kidney pimple"; the second the "kidney carbuncle". The lesions break thru cortex to form perirenal abscesses. In some there might be a lymphatic spread from parenchyma to the perirenal tissue. Rarely the abscess breaks into pelvis of kidney.

Clinical Features:

Often begins with acute pain in upper abdomen or loin. Some have insidious onset. Rigor is reported. There is fever. As a rule urinary symptoms are absent. Thigh is held flexed. In children there may be pain in hip. On examination there is tenderness, resistance or a mass on the affected side. Posterior tenderness is constant. There is diminished respiratory excursion. On X-ray examination (Bela Alexander: Text: The Examination of the kidneys and urinary tract 1912) there is (1) absence of the clear outline of the psoas muscle, (2) obscure renal shadow, (3) scoliosis of lumbar spine with concavity towards affected side. These x-ray signs are present with perirenal abscess or perirenal effusions of blood.

Treatment:

Author leans toward conservative attitude. Simple drainage of perirenal abscesses usually is sufficient for a cure. Since these result from cortical abscesses, it follows that simple incision of renal abscess is preferable to nephrectomy. Resection of involved portion is not recommended. Should the benefit of incision of the renal abscess be insufficient, secondary nephrectomy may be performed.

All cases of healed perirenal abscess should have a subsequent urological study.

8. Staphylococcic Pneumonia.

Chickering, H. T., and Park, J.H. J.A.M.A. 72:617 (Mar.) 1919.

In 800 pneumonia cases at Rockefeller Institute there were found 13 due to staphylococcus aureus. The focus for infection was obscure in most cases. There was one case secondary to each of the following: a felon, scalp infection, measles, and a Group IV pneumonia.

These authors studied by cultural methods 312 cases of pneumonia that died at Camp Jackson, S. C., during the "flu" epidemic. In these 312 cases staphylococci were found in 153, or 48% (secondary invaders?).

In this group the staphylococcus

was found alone in 92. In the remainder it was mixed with streptococci, pneumococci, B. influenza, and other organisms.

From these cases several features peculiar to staphylococcic pneumonia are described.

The incidence varied from 8% to 12% depending on the army division and the locality the men came from.

The clinical features were insidious onset, extremely rapid course, cyanosis, picture of profound general sepsis, sweating, high fever, slow but weak pulse and indefinite findings on physical examination and x-ray. Death occurred usually on the 6-10th day.

1 - 5 days . . .	8%
6 -10 " . . .	48%
11 -15 " . . .	27%
After 15 " . . .	18%

Sputum: The most typical finding was the friable purulent sputum of a dirty salmon pink color resembling anchovy sauce. Occasionally sputum was bloody, rarely it was green.

Blood cultures were positive in 53%. Pleural effusion was only occasionally present. Leucopenia was frequently observed and was thought to be due to a toxic depression of the hemopoietic system.

Complications: Most cases died before complications could set in.

Empyema	3
Otitis Media	7
Meningitis	1
Pericarditis	1
Parotitis	1
Furunculosis	1

All of these had positive blood cultures.

Pathology: The autopsied cases showed a pneumonitis with multiple miliary abscesses.

Treatment proved entirely ineffective. 64 cases were diagnosed clinically. Only 2 of these lived. Note: We are seeing more pneumonia of this type on the wards.

9. Liver Abscesses.

Beaver, D. C., Pyogenic Abscesses of the Liver; A.J. of Path. VII: 259 (May) '31.

Opportunity for infection of the liver is afforded by way of portal system, hepatic artery, bile ducts and lymphatic system.

Abscesses originating from infection carried by way of hepatic artery is almost never found except in a general pyemia and then it is secondary to pulmonary or cardiac involvement. Abscesses formed in this way are multiple, small and usually involve all lobes of the liver equally. Subcapsular localization is most common. In most cases, the patient dies of general infection before attention is directed toward the liver.

Instances are reported, however, of liver abscesses which produced their effect without first involving the heart or lungs. (See our case).

Abscesses from biliary tract are part of a suppurative cholangitis.

Abscesses from infection transported by the portal vein compose greatest group of all liver abscesses.

Organism: Staphylococci are predominating organism in all types of abscesses with streptococci next.

The author presents eight cases of liver abscess which were chronic and had characteristics of granulomas. They were characterized by insidious onset, chronicity, cryptogenic character, and their tendency to persist as granulomas.

This author believes that the abscesses were of portal origin. However, review of the cases shows one case had draining cervical nodes, and another empyema. Only one was very definitely from portal circulation - due to ruptured duodenal ulcer. The remainder had no definite focus (one of our previous cases).

These cases were all of long duration, illustrating that the liver, like bone, skin, or lung may be the seat of long standing abscesses.

10. Perihepatic Abscesses.

Whipple, A. O.; A. Jr. of Surg. 40:1 (Jan.) 1926.

A review of 32 personal cases

and 1000 cases collected from the literature. This again illustrates that the principle source of liver or peri-hepatic infection is secondary to suppuration in the abdomen but that a certain number may be from distal or undetermined foci.

32 personal cases:

Liver . . . 10	Perforated intestine 2
Stomach . . . 4	Empyema 2
Duodenum . . 3	Kidney 2
Appendix . . 5	Peritonitis 2
Pelvis . . . 3	Undetermined 2

Staphylococci was the offending organism in 5 cases.

11. Prostatic Abscess.

Ball, W. G., Brit. Jr. of Urol. 3:172 (June) '31.

Metastatic prostatic abscesses are uncommon. Those due to local causes, trauma, gonorrhoea, are more common. Two cases of metastatic abscess are described. Both occurred after furunculosis. The literature is cited. The symptoms are either acute or chronic. Painful urination and pain in the perineum are prominent. The insidious cases are usually diagnosed as prostatic hypertrophy.

12. Staphylococcic Perimeningitis.

Lowenstein, P.; J.A.M.A. 97:319 (Aug.) '31.

Describes a metastatic abscess about spinal dura causing pressure on cord and root irritation. Sometimes condition is secondary to osteomyelitis of the spine.

13. Staphylococcic Meningitis.

Ballenger, H. C.; J.A.M.A. 94:104 (Apr. 5) 1930.

Believes condition is relatively infrequent. Neal (1924) in 1535 cases found staphylococci rarely. At the Children's Memorial Hospital (Chicago) from 1909 to 1929 there were 297 cases of meningitis. All but 24 were epidemic. One of these 24 was due to staphylococci

and this was secondary to frontal sinusitis.

14. Staphylococcic Infections and Anemia.

Venables, J. F., Guy's Hosp. Reports, 80:200 (Apr.) '30.

Witts, L. J., Guy's Hosp. Reports, 80:203 (Apr.) '30.

A case of profound secondary anemia in which there was found an empyema of the gallbladder with staphylococcus as the causative organism is reported. It was felt that this was a factor in the production of the anemia.

15. Food Poisoning.

Dack, G. M., et al; Jr. of Prev. Med. 4:169, '30.

Jordon, E. O.; J.A.M.A. May 24, 1930.

True food poisoning is rare. This constitutes the second report. The attack was due to holiday cake and the infection was traced to eggs used in its production. The previous report concerned cases due to infection through the milk of a cow with an infected udder. Jordon studied the case of cake poisoning and came to the conclusion that staphylococcic organisms of various strains could generate in broth a substance producing a gastroenteritis. Note: Most important contribution (see daily papers on bakery goods poisoning.)

Note: Staphylococcic lung abscess and brain abscess have been omitted in this report because this subject will be especially presented at a later date.

Treatment - General.

Surgical interference has been presented under the special headings.

General management summarized from the various writers consists of bed rest, sedatives, high fluid intake, sunlight or heliotherapy, transfusions, etc.

Special forms of treatment have been tried - tin oxide (stannoxyl),

intravenous antiseptics, bacteriophage and vaccines. The reaction to these is very variable. They are: 1. no value; 2. of some value; or, 3. of extreme value; depending on the individual report. No large convincing series are available.

16. Intravenous Vaccine Therapy in Staphylococcal Infection.

Clawson, B. J., and Allen, P. K.; Arch. of Derm. & Syph. 23:894, '31.

Experimental work on streptococci has shown:

1. A localized lesion with destruction such as an abscess tends to make an animal allergic to subsequent injections.

2. This local infection stimulates only slight immunity as indicated by agglutinins.

3. Further injections do not desensitize but probably produce more hypersensitivity.

4. Animals made hypersensitive to streptococci can be desensitized and new lesions prevented by intravenous administration of vaccine.

5. 3 cases of chronic staphylococcal infection were treated by the vaccine treatment, all with a cure and these conclusions are drawn:

Patients who are hypersensitive to staphylococci and in whom new lesions frequently develop may be desensitized by intravenous vaccination and new lesions prevented.

Intravenous rather than subcutaneous vaccination may be indicated against chronic recurrent infection due to staphylococcus.

Impressions:

1. Attention is called to the importance of staphylococcal skin lesions and other suppuration as foci of infection. Interest in streptococcal lesions has overshadowed the former.

2. Staphylococcus albus is one of the saprophytes of the skin. Under certain conditions it may become pathogenic or be associated with other skin infections. Staphylococcus aureus is usually the cause of suppuration.

3. While metastatic foci usually result from the skin, the nasopharynx and paranasal sinuses may be factors.

4. Primary staphylococcal infection of the nose, lips and face is a serious condition. It is usually preceded by an injury (scratch) and spread by way of the facial vein because of the absence of valves. Conservative treatment and not ligation is recommended in recent reports.

5. Staphylococcal septicemia is usually abrupt in onset. Prostration and the usual signs of sepsis are present. Positive blood cultures with high bacterial counts are obtained in many. Infection tends to localize in the bones of children and the viscera of adults. Poor general resistance seems to favor it. Mortality varies from 40 to 90%.

6. Metastatic foci from staphylococcal skin lesions and other suppuration may occur in a variety of places. No part of the body is immune, although some show special liability.

7. Osteomyelitis is most apt to develop in the upper end of the tibia, upper end of humerus and lower end of the femur. Injury apparently is not an important factor in localizing the infection. Some authors have ascribed the metaphyseal capillary structure as the predisposing factor.

8. The diagnosis of osteomyelitis should be considered in children showing signs of sepsis and painful localization in the bone. Immediate decompression is indicated. If the child continues to show signs of sepsis, it is probably not due to incomplete treatment of osteomyelitis but to the development of foci elsewhere.

9. Primary purulent, serous arthritis and arthritis due to staphylococci is possible. Most result from extension from neighboring bone. Amputation is indicated in purulent arthritis.

10. Staphylococcal endocarditis comprises 13% of all bacterial cases (autopsy). Duration is usually short, associated lesions are found elsewhere and the condition may be considered a terminal affair in most instances.

11. Renal staphylococcal infection is well-known. Trauma is apparently an important factor in localization. Peripheral foci in the skin are usually responsible and the cortex is the favorite site of involvement. The

lesion may rupture into the perirenal space. Males predominate. With localizing signs over the kidney and the picture of sepsis, the diagnosis is usually not difficult. X-ray examination is very helpful (no clear outline of psoas, absent renal shadows, scoliosis of lumbar spine). Simple drainage apparently is the treatment of choice; secondary, nephrectomy for more involved kidneys which fail to heal.

12. Staphylococcic pneumonia makes up about 12% of all pneumonia cases. Condition has not been frequently diagnosed during life (in past). The picture of profound sepsis is present and the origin is not obvious in many (throat?). Death usually occurs between the 6th and 10th days. The sputum is said to be characteristic. Blood cultures are positive in about one-half the cases. Lesions in the lung resemble nodular infiltrations and abscesses similar to those seen in the kidney. This type of pneumonia is apparently on the increase?

13. Liver abscesses may arise as the result of infection through the portal or general circulation, bile ducts or lymphatic system. Subcapsular location is most common and staphylococci are the predominating origin (streptococci next). In many instances the liver abscess is apparently a cryptogenic lesion and may be chronic (granulomatous).

14. Perihepatic abscess is usually secondary to suppuration in the abdomen but a certain number apparently arise from distant or undetermined foci.

15. Prostatic abscess may result as metastasis from skin infection or other suppuration. Staphylococcic perimeningitis (around spinal dura) usually gives findings of cord tumors and is usually a serious lesion. Staphylococcic meningitis is apparently not so common.

16. Staphylococcic infections may produce a severe anemia, either as an isolated condition or a part of the general picture.

17. Increasing instances of food poison due to staphylococci are now on record. Organisms are isolated from bakery goods in **most** instances. Coccal filtrates show substances which are capable of producing gastroenteritis in volunteers. Possible source of infection is eggs, milk from infected udders of cows, etc. The usual reports in the daily papers concerning bakery goods poisoning are due to staphylococci.

18. Surgical interference and general management are indicated in staphylococcic infection. Special forms of treatment have been tried, tin oxide, intravenous antiseptics, bacteriophage and vaccine. Reports concerning results of these special forms vary greatly.

19. Intravenous vaccine therapy has been tried by Clawson and Allen. Patients who are hypersensitive to staphylococci and in whom new lesions frequently develop may be desensitized by intravenous vaccination and new lesions apparently prevented.

20. It must be remembered that while staphylococci usually cause abscess formation that certain strains apparently may produce cellulitis not unlike streptococci. The tendency for the organism to occasionally appear in chains is responsible for difficulty in etiological determination in some cases.