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AN

INAUGURAL DISSERTATION

ON

Synovial Bursæ,

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BY

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OF

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To

John M. Watson, M. D.

&

Charles K. Winston, M. D.

Professors in the Medical Department of the University of Nashville, Tenn.

For their intimate friendship so uniformly manifested towards me; and also, for their many virtues and devotion to honorable medicine, the following pages are respectably inscribed as an humble Tribute of my sincere Gratitude.

Synovial Bursæ or Bursæ Mucosæ

Where many important tendons glide over osseous projections; where tendons move freely with each other or extensive motion is required of them in the soft parts; and where considerable movement of the skin is necessary over bony prominences, are placed these lubricating sacs, with the special design, no doubt, to diminish friction, and thereby to perfect the elegancy and freedom in the mechanism of animal motion which perfections are characteristic of all the creations of the Great Creator!

These bodies are analogous to the synovial sacs of the joints. It may, with propriety, be said that they are

identical in their internal structure and function differing from these only in their situation.

The subject of this dissertation requires the following divisions, viz. Anatomy, Physiology, and Pathology, under each of which it should be properly considered.

Their anatomy and physiology will be best understood if presented in connection which, to me, appears more natural. To understand this subject properly, requires a knowledge of the synovial membranes of the joints which are usually described in the standard works on anatomy and physiology with a considerable degree of accuracy; but these

common authors in their elementary works deal with the synovial bursæ very briefly, leaving the student to arrive at his conclusions concerning them from his knowledge of those of the joints.

Their number in the human subject is variously stated by different authorities. Dr. Gross reckons them at about one hundred and fifty, while Hooper's Dictionary estimates them at sixty two which being in pairs make one hundred and twenty four. This corresponds, I believe, with Tarcoast's Plates. The seeming contradiction of authors on this point, arises from the fact that the number varies in different subjects,

and not unfrequently in the same individual, depending on the mode of living or the avocation at different periods of life. I know a practical printer who, from the nature of his occupation frequently resting on his elbow, caused an extensive development of the subcutaneous bursa on the dorsal aspect of the olecranon process of the ulna. Also another one in a young man who had by accident an extensive wound of the foot made by a common axe dividing in part the first metatarso-phalangeal articulation, and also the second metatarsal bone was divided near its proximal extremity, the wound extending

backwards and outwards. On his recovery from this wound there was a considerable prominence on the foot caused by an elevation and hypertrophied condition of the distal extremity of the first metatarsal bone. By wearing his shoe a few months there was developed a considerable bursa over this projection. During its formation it occasionally gave him pain, some signs of fever being present, which abated on removing his shoe for a time.

According to Liston, page 82, "Occasionally a portion of the cellular substance, which is exposed to pressure of motion, as over a prominent portion of bone, assumes the appearance of a bursa, secretes a similar fluid, and is similar-

ly affected in consequence of inflammation. These adventitious bursæ are met with in various situations. Bunion is a good example of such a bursa thickened from long continued pressure They are seen on the outer ancles of Taylors, on the shins of boot-closers, on the forehead, elbow, &c."

By the use of the part they appear to be developed. This is known to be the case with the subcutaneous variety. Whether deepseated ones are ever caused to form it is not so easy to demonstrate. I think not, from the fact, that these parts cannot be subjected to the same influences as the subcutaneous, viz. pressure and motion continued.

Their locality in the human subject is

pointed out in Hooper's Dictionary and also in Pancoast's Histar. The adventitious variety would depend, in their situation, on the cause which produced them. Sharpey and Quain, page, 246, states that; —"In point of situation the bursæ may be deepseated or subcutaneous. The former for the most part are placed between a muscle or its tendon and a bone or the exterior of a joint, less commonly between two muscles or tendons; certain of the bursæ situated in the neighborhood of joints not unfrequently open into them."

These sacs or pouches are composed of a serous membrane which, as before stated, has the same anatomical

structure as the serous membranes of the great cavities. The peculiar structure of the bursal membrane is, that, like serous membranes generally, it contains an epithelial coat with a free internal surface and an exterior fibrous coat which is connected by areolar tissue to the surrounding parts. These two principal tunics are connected by areolar tissue thus constituting three tunics, viz. a fibrous membrane externally, a cellular or connecting membrane, and a serous membrane internally; thus constituting what is denominated a fibro-serous membrane. The epithelial coat is a single layer of particles which are polygonal in shape and of transparent texture.

It has a tesselated appearance. My idea of the minute structure of these sacs is mainly derived from the "Microscopic Characters of Synovial and Serous Membranes" by Todd and Bowman, pages 129 and 130, whose language on this subject I will take the liberty to quote. "These membranes appear to be essentially alike in their minute structure. On their free surface is a single layer of epithelium, the particles of which are polygonal in shape, and of transparent texture. (The figures, drawings, etc. I omit). We have found this epithelium to rest immediately on a continuous transparent basement membrane of excessive tenuity, apparently identical with that

which supports the epithelium of mucous membranes. Beneath this is a lamina, of areolar tissue, which constitutes the chief thickness of the membrane, and confers on it its strength and elasticity. This areolar tissue is traversed by a network of capillary vessels, the meshes of which are large and of unequal size, and by lymphatics and nervous filaments in varying number. It is of close texture, and continuous with that laxer variety by which the membrane is attached to the parts it lines.

The most favorable position for examining the areolar tissue of serous membrane, is the transparent part of the messentery, or of any of the duple

to the admixture of the yellow fibrous element in the layer which forms the chief substance of the membrane. These tissues are entirely devoid of vital contractility and their sensibility is low, except in a state of acute inflammation."

Sharpey and Quain under the caption of Synovial membranes include three varieties, viz. articular, vesicular, and vaginal. I propose a description of the vesicular and vaginal in the same connection and I have referred to the articular only so far as was necessary to understand these. They state that, the synovial sac is flattened with its internal surfaces in apposition gliding over

each other and lubricated with synovia.

Synovia and a free motion are the physiological function of these sacs, by which friction is lessened. The synovia is the same as that of the joints, so far as known, and is according to Todd and Bowman, page, 128, "a transparent yellowish white fluid, viscid like the white of an egg." It is an alkaline fluid containing albumen and salts, such as are found in the serum of the blood, and does not coagulate spontaneously. It coagulates at about 212°. It is specially lubricating and well adapted to the purposes for which it is designed.

On the precise manner in which the synovia is secreted writers have not agreed.

It is certain that it is secreted by the inner tunic. In all synovial membranes there are duplicatures of this inside tunic which are very vascular. Whether these, as Havers thought, are glands or not, have not been fully settled. I am inclined to think they are extenuations of the secreting surface of the membrane.

Pathology.

I find on examination of the best authorities that I can command, that these membranes are subject to the same diseases as those of the joints, modified only by their relation. This fact will readily be inferred from the similarity and

structure and function of the one to the other. The synovial bursæ perform the same office for the parts in which they are situated that the synovial membranes of joints do for their connections; hence the similarity of their diseases.

Inflammation first demands our attention, which as usual is divided into acute and chronic. The first is characterized by the ordinary signs of pain, swelling, heat, and redness. The pain will much depend on the situation of the particular bursa affected. If the membrane surrounds a tendon, or is bound down by dense and unyielding structures, the pain will be greater

in proportion to the transfaction.

The morbid appearances of this membrane, under inflammation, is that of serous membranes generally. First a red point or line presents itself, then spreads till the whole surface of the membrane is redened. The capillaries which in the normal state did not transmit the red globules of blood, now admit their passage, and the membrane assumes a vascularity proportionate to the intensity of the inflammatory action.

The results are first an exaltation of function causing an extra amount of Synovia; then serum is effused, with coagulable

lymph, giving the synovia a watery and also a flocculated appearance. If the inflammation runs a high grade, the effused fluid may have a reddish color owing to the presence of some red globules of blood. The inflammatory action frequently goes on to pustulation, forming an abscess, or even to ulceration.

The tumor will vary from the size of a partridge egg to that of a cocoa-nut. If the affected bursa be superficial it is easily diagnosed by its situation and fluctuation on percussion. The deepseated are difficult to diagnose from other tumors and are always of great perplexity to the surgeon. If the deepseated

be in an ulcerative state, they generally become so blended with the cellular tissue that he cannot distinguish the affection from one arising originally in this tissue. Bursal tumors generally point externally.

There may be erysipelatous inflammation of the adjacent skin in connection with bursitis.

The areolar structure immediately surrounding the bursal tumor is congested with serum.

The causes of bursitis are external violence, pressure, abuse of mercury, rheumatism, scrofula, etc.

The treatment consists in the antiphlogistic plan, such as rest, leeching, fomentations, nauseants, and

cathartics containing a mercurial if the symptoms are urgent. If the serous fluid is not absorbed and the disease appears to linger, use discutients freely. If suppuration has taken place and an abscess is formed, make a free and direct incision into the centre of the tumor letting its contents out treating it as an ordinary abscess. If the affected bursa be near or in conjunction with an important joint, the above treatment must be more energetic in proportion to the danger thus impending.

Chronic Bursitis runs its course slowly as the term implies. The cause is usually that of pressure; and the

result, a clear watery synovia constituting synovial dropsy. Removal of the cause and rest constitute the principal treatment. Discutients must be employed, and for some time to remove this dropsical effusion. Continued rest is of great consequence. The parts may require support by light bandages. If the above means fail the tumor may be opened, its contents discharged, and tincture of iodine injected.

The prognosis is usually discouraging to the patient. The cure may require months and as rest is absolutely necessary, he is not apt to comply with directions.

A hypertrophied condition of the

membrane may be the result of inflammation. Sir Benjamin Brodie states that he has seen it one half inch thick. In the centre of such a tumor may be a little synovial fluid. Professor Miller of Edinburgh, says it may have a fibrinous degeneration. In either case the only reliable treatment is by excision. This should be resorted to only when the tumor is troublesome and superficial.

Indolent ulcers sometimes result which require a seaton, probe, or something to set up a new action in the part. In some very indolent cases where the pustular discharge escapes through a fistulous opening and is mixed with a degenerated syn-

ovia, an escharotic will do well; the sac being destroyed will come out with the slough and healthy granulations spring up.

In treating this disease, as well as others, the intelligent practitioner should never loose sight of the cause. If the disease comes from a rheumatic diathesis or a scrofulous one, the appropriate constitutional treatment must be combined with the local.

Prof. Miller in his principles of surgery takes up thecitis under a separate head; the other authorities which I have consulted on this subject include thecitis under the term bursitis. What has been said by me concerning bursitis is appli-

cable to Thecitis, except that it requires more care in the treatment as the Thecæ approach, in structure and function, the character of joints more than do the bursæ.

Loose Bodies. These are said to resemble melonseed in shape and size, and are of a brownish color. They are of a semicartilaginous consistence, yet not so hard as those of the joints from the circumstance, in my opinion, that they are not subjected to as much pressure in the motion of the parts.

Their remote origin is inflammation. I can do no better than give Brodie's account of their origin in his work on "Diseases of the Joints," page 390.

"There seems to be no doubt that these loose bodies have their origin in coagulated lymph which was effused in the early stage of the disease; and I have had opportunities, by examination of several cases, to trace the steps of their gradual formation. At first the coagulated lymph forms irregular masses of no determined shape, which afterwards, by the motion and pressure of the contiguous parts, are broken down into smaller portions. Those, by degrees, become of a regular form, and assume a firmer consistence; and at last are converted into the flat oval bodies, which has just been described."

The idea of their growing from

the inside of the sac and then becoming detached by friction, is not so probable as Brodie's account of their origin. Miller says they "seldom exist single and may be very numerous." Their most usual situation is about the tendons of the hand and the shoulder joint. On motion of the part they cause a grating crackling sound. They are found floating in a thick glairy fluid.

Their presence may keep up inflammation and fumefaction, the inconvenience of which may require their removal which is done by puncturing the bursa provided it is superficial. If deepseated or near a joint Miller's plan is the

best:—principles of Surgery, page 545.
"Such loose substances, therefore,
should not be interfered with by
operation, unless when specially trou-
blesome; and the subcutaneous and
valvular method of incision will
probably be the most expedient. Nor,
when numerous, should an attempt
be made to remove them all at once;
otherwise atmospheric entrance is
likely to take place, bringing on
the dreaded inflammatory action.
By repeated punctures, however, they
may at different times be safe-
ly extruded. Should inflammation
and suppuration unfortunately
occur, we must unhesitatingly
make a free and direct incision;
braving the worst." Intense in-

flammation may supervene which must be combated by appropriate remedies judiciously employed.

Gross says, "Bodies closely resembling hydatids are sometimes found in the synovial bursæ." Prof. Cloquet of Paris professes to have seen one hundred and forty of these hydatids in one bursa, varying from one to three lines in diameter, nearly transparent and of a lenticular shape. They were in the bursa found between the great trochanter and the tendon of the gluteus Magnus muscle.

Ganglia. These bodies are of an ovidal shape, and from the size of a pea to that of an apricot. They are enlargements of the thecal membranes of the tendons and appear to be attach-

ed to them. Dr. Gross thinks they are the result of dropsical accumulations. They are the consequence, with all probability, of a strain, or bruise, or some other external violence. Their most usual situation is on the flexor tendons of the hand or about the foot. They are said to occur most frequently in females. They are observed on the legs of almost every work-horse and are called wind-galls. They contain a glairy viscid fluid, much like the white of an egg. Dr. Gross says, "Sometimes along with the fluid, the sac contains a number of loose bodies, similar to the concretions found in the movable joints and synovial bursæ.

They are of a pale yellowish color, tough consistence, shaped like gourd seeds, and of variable size, from that of a grain of wheat to that of a bean."

Deformity, more than inconvenience or pain, is usually the result of ganglia.

The treatment is simple. In recent ones pressure with one or both thumbs on the tumor causing the rupture of the membrane and the escape of the fluid into the areolar tissue; or if the thumbs fail, puncture the ganglia subcutaneously with a needle so as not to admit the air, and then press the contents into the areolar tissue. Let continued pressure be maintained with compress & bandage in order

to promote absorption. Friction occasionally should be applied so as to keep up the inflammatory action in order that the serous membranes may adhere and prevent a return of the disease. Dissection or excision properly speaking is seldom justifiable.

It may not be amiss to notice some of the particular bursæ.

1. The hyo-thyroid bursa, situated as its name implies, may become inflamed and enlarged requiring leeches, fomentations, &c. The chronic require discutients. A tumor here would obstruct deglutition.

2. The bursa over the olecranon is very liable to injuries, by falls. Bursitis here requires the ordinary treatment, except when associated with

erysipelatous inflammation which must be met with the appropriate remedies. If matter forms in any bursa it must be evacuated.

3. The bursa over the patella, of all, is the most frequently enlarged. The part is much exposed to injury, by kneeling. House-maids & Shop-keepers are particularly obnoxious to it. It is called "House-Maid's Knee." No peculiarity in its treatment. It is of every importance, however, to diagnose between this and affections of the knee-joint.

4. Bursæ frequently form over the ends of bones after amputations. These are liable to bursitis by blows or other injuries. The tumefaction and pain may mislead

to the supposition of an abscess. Diagnosis is of importance for the treatment differs between an abscess and an inflamed bursa.

This seemingly insignificant subject was selected from my having seen a very interesting case last year. I expected to report the case in this thesis but was unable to get the notes on the case in time.

Errata.

Page 3. Line 5. For "those" read the synovial membranes

" 11. " 14. Streached for Stretched.

" 17. " 17. Read anatomical relations.

18. And for in.

" 22. " 2. For synovial read bursal.

" 24. " 7. Loose for lose.

" 30. " 16. Ovidal for ovoidal.