distance, but, as a rule, in quite a thin layer, while here and there greater growth has occurred and the previously-mentioned changes in the cartilage are taking place, and thus we come to have islets of soft material filling depressions on the surface of the cartilage, separated by patches of but slightly altered cartilage, and connected by a thin layer of soft tissue on the surface of the cartilage. In this way the pitted or completely perforated appearance of the shreds of cartilage is produced. This is well seen in this specimen (Fig. 12), where a number of these depressions are present. [Other specimens were shown, illustrating in a more marked degree the result of the erosion of the surface of the cartilage, and also showing the presence of tubercular tissue in some of these depressions.]

The chief destruction of the cartilage occurs from the surface in the manner just described, but we not infrequently observe somewhat similar changes in the deeper part, especially at the margins. In some cases also osteitis, without formation of tubercle, occurs in the superficial cancelli of the bone over a considerable area, and a slight amount of soft tissue is formed between the bone and the cartilage, and this is what has usually occurred in those cases where the apparently unaltered cartilage can be moved over the bone beneath.

As a rule, when the deeper part of the cartilage becomes affected one of two things happens, namely, either from the margin of the cartilage, or from the bottom of one of these excavations on the surface the newly-formed tissue spreads in between the cartilage and the bone, destroying the deeper part of the cartilage, detaching it, and leading to exfoliation of pieces of as yet unaltered cartilage; or tubercles form in the superficial cancelli, destroy the superficial layer of the bone, and lead to erosion of the deeper part of the cartilage. This erosion of the cartilage from the deeper surface is, however, a comparatively rare occurrence, except at the margins where the process has begun at the surface, as previously described. [Specimens were shown illustrating these points.]

Another mode of destruction of cartilage is seen in this specimen (Fig. 13) which is a vertical section of the internal condyle of the femur from a case of disease of the knee-joint of six months' duration, in which the disease was primarily synovial, and in which there was great thickening of the synovial membrane. The cartilage was intact except at the margins and at one spot towards the centre and anterior surface of the internal condyle of the femur, where there was a small depression on the surface. This photograph is taken from a vertical section of the end of the bone through this spot. We see that the depression in the cartilage is due to destruction of the cartilage at this point, and before the celloidin was dissolved out one or two small detached fragments of cartilage were seen at the surface which have been swept away in clearing the specimen. We further see a number of flask-shaped spaces in the cartilage, which under a higher power are seen to be filled with young fibrous tissue. Some of these spaces communicate with the surface of the cartilage either freely or by narrow channels, while the majority, and perhaps all, are connected with the superficial cancelli of the bone by similar channels. At various other points along the deeper part of the cartilage we see similar flasklike projections communicating with the bone, and where these occur the most superficial cancelli show osteitis. I have not been able to find any tubercles in the bone.

Before leaving the subject of the changes in cartilage, I may refer to the important question whether cartilage can be the primary seat of the disease. As regards hyaline or articular cartilage, this may certainly be answered in the negative, but it is still an open question with regard to fibro-cartilage. In the case of the spine it was long thought, and is I believe still held by some, that the changes frequently commence in the intervertebral cartilages, but this is clearly not the case. In the knee-joint, however, Kocher has described, under the term "meniscitis fungosa," what he believes to be primary tubercular disease of the semilunar cartilages, but there is no evidence that the disease did not begin in the synovial membrane in the neighbourhood of the cartilage and spread on to it.

BALNEOLOGICAL CONGRESS.—The thirteenth Congress of Balneologists will be held at Berlin in March, 1891, under the presidency of Professor Liebreich. Notice of communications, etc., should be sent to the General Secretary, Dr. Brock, 42, Schmidtstrasse, Berlin.

THE BENIGN NEOPLASMS OF THE RECTUM.

Read in the Section of Pathology at the Annual Meeting of the British Medical Association, held in Birmingham, July, 1890.

By CHARLES B. BALL, M.Ch., F.R.C.S.I.,

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MORBID growths are met with in the rectum and at the anus with great frequency, and, as compared with other portions of the intestinal tract, the fact that this part of the gut can alone be examined during life with facility renders the proportion met with in this region apparently large, yet it cannot be denied that the termination of the bowel is very much more frequently affected than the other portions by these growths. This is more particularly noticeable in the case of piles, or hæmorrhoids, which constitute by far the commonest tumours of the rectum and anus, but are unknown in the other portions of the intestinal tract. Owing to the more potent sources of irritation to which the lower bowel is subject, the greater liability to tumour formation can readily be accounted for, and in the case of hæmorrhoidal tumours there is a distinct anatomical reason for their existence here. During the passage of a solid mass of fæces along the great intestine, the contraction of the muscular tissue causes a considerable pressure to be exercised on the blood vessels. In the upper portions of the intestinal tube this is rather salutary than otherwise, as the vessels here are for the most part arranged at right angles to the axis of the bowel, so that the contraction of the tube empties the veins into the larger channels, and thus materially aids in the circulation of blood; but when the termination of the rectum is approached the conditions are materially altered, because the blood from the lower portion of the bowel passes up by the superior hæmorrhoidal veins, the tributaries of which originate at the junction of skin and mucous membrane. These vessels, instead of being arranged at right angles to the axis of the intestine as is the case higher up, are parallel to the axis, lying immediately under the mucous membrane, so that as the fæcal mass is pressed onward by the contracting muscular wall, there is a tendency to force back the column of blood in the veins towards the tributaries, which are therefore liable to become dilated and varicose; indeed, a slight amount of varicosity of these veins is held by some authors to be normal. This liability is further augmented by the fact that the radicles of the superior hæmorrhoidal veins have but trivial anastomoses with the inferior and middle hæmorrhoidal veins, so that but little relief can be afforded to the distended veins by the passage of blood *via* the inferior and middle hæmorrhoidal veins into the general or caval circulation.

Various terms have been used to designate the forms of hæmorrhoids, external and internal, the former of which are subdivided into venous, cutaneous, and compound, while in the latter the venous, columnar, and nævoid varieties are recognised. Now, although these varieties possess points which render them clinically important, it cannot be maintained that they are distinguished by marked pathological characteristics. When taken broadly, the pathology of all is practically identical, namely, increase and dilatation of the blood vessels, more particularly the veins with proliferation of the connective tissue. In the case of external piles the covering is the scaly epithelium of the anal canal, while internal piles are covered with mucous membrane.

I have elsewhere endeavoured to show¹ that extravasation of blood is not an important factor in the pathology of piles. In the simple venous external pile which appears apparently suddenly, what really happens is this: A varicose condition of one or more of the inferior hæmorrhoidal veins has previously existed without attracting the attention of the patient; it is only when thrombosis and perivascular inflammation supervene that the tumour is noticed, and the patient has what is known as "an attack of piles." That this is indeed an intravascular, and not extravascular, coagulation of blood can easily be demonstrated; if an incision be made into a simple inflamed external pile a blood clot can be turned out leaving a smoothly lined cavity in which an endothelial lining can be observed; moreover, as a result of stretching of the anus—now the prelude to almost all rectal opera-

¹ *The Rectum and Anus, their Diseases and Treatment.*

tions—extravasation of blood is of very common occurrence, yet we invariably see it as a widely diffused ecchymosis, which is rapidly absorbed, and not as a localised blood clot similar to what we know as an external pile. That except in external covering there is no essential difference in the structure of an internal and an external pile, the following specimen will show. This and the other illustrations of this communication are from microphotographs kindly made for me by Professor Scott.

Fig. 1.—Section of intero-external pile $\times 3$ diameters. *a*. Skin of anal canal. *b*. Mucous membrane. *c*. Laminated blood clots in the interior of dilated veins.

Here it may be seen that above and below the muco-cutaneous juncture large thrombosed veins (*c*) are filled with laminated coagula, and between these there is considerable proliferation of the connective tissue in which moderately large arteries ramify. The mucous membrane (*b*) covering the internal portion has lost much of its character from frequent prolapse, but is still quite recognisable.

Fig. 2.—Fibrous polypus of rectum $\times 2\frac{1}{2}$ diameters. *a*. Hæmorrhoidal structure. *b*. Fibrous tissue. *c*. Altered mucous membrane.

External piles which have been frequently thrombosed eventually become converted into but little else than connective tissue covered with scaly epithelium, the large dilated veins disappearing, the whole structure being not much more vascular than the surrounding skin; this is called the cutaneous or fleshy pile. A

precisely similar change may take place in internal piles, resulting in the production of what is known as fibrous polypus of the rectum. This change, however, is not so common as in the case of external piles, no doubt owing to the more frequent irritation to which the latter are liable. From an examination of a somewhat large series of pile sections, it can be demonstrated that in cases of tolerably long-standing internal hæmorrhoids, the characters of the section illustrated in Fig. 1, which was taken from a

Fig. 3.—Adenoma of rectum $\times 10$ diameters. *a*. Glandular structure. *b*. Hilum of connective tissue and vessels. *c*. Mucous membrane cut longitudinally. *d*. Mucous membrane cut transversely. *e*. Solitary gland.

case of recent origin, become somewhat modified; the dilated and thrombosed veins are less remarkable and the connective tissue more abundant and fully developed; this is a change which can be readily recognised in the living body; the soft and brighter red internal hæmorrhoid becomes firmer to the touch and whiter in colour—indeed, in extreme cases, the covering is almost the same colour as the adjoining skin, instead of the bright red colour of normal mucous membrane. Once this change has occurred, the altered structure tends to become more and more pedunculated until the fibrous polypus, attached by a more or less narrow pedicle, is produced.

Fig. 4.—Adenoma of rectum from case of rectal cancer $\times 12$ diameters. *a*. Glandular structure. *b*. Connective tissue and muscularis mucosæ. *c*. Healthy mucous membrane. *d*. Muscular coat of bowel.

The specimen from which Fig. 2 was taken was removed from a case of twenty years' standing. The lower extremity of the rectum was completely surrounded with typical pile structure,

from which were hanging five firm fibromata, attached by narrow pedicles; these I believe to have originated in frequently prolapsed piles, a theory which I have been enabled to support by tolerably numerous observations on the intermediate stages of growth taken from a number of cases.

Adenoma.—The polypus met with in early life is usually a true adenoma, and although probably occurring in all parts of the intestinal tract, is met with most frequently in the rectum. This may probably be due to the more frequent irritation to which this portion of the bowel is subject. It commences as a proliferation and general enlargement of the Lieberkühn follicles, which causes the mucous membrane to buckle up. When this has reached a sufficient size to offer an obstruction to the passage of feces, and be dragged upon by peristaltic movement of the intestine, a pedicle is formed. When the tumour originates high up, the pedicle becomes gradually elongated until the polypus touches the anus, and is finally extruded at defæcation; it may then be strangulated, or the pedicle ruptured and the tumour voided; while in other cases prolapse or intussusception may be induced. These tumours rarely grow to a large size, and are usually single; they may, however, occasionally be multiple, and in a few rare cases the entire surface of the mucous membrane may be studded with them.

Fig. 3 was taken from a child who came into hospital with a prolapse, at the apex of which two small polypi, the size of peas, were found, but as yet no distinct pedicles had formed. The section was made through the hilum of the largest of the growths, and shows the proliferation of gland tissue with the central mass of connective tissue, from which septa radiate; the section has traversed a solitary gland.

Fig. 5.—Papilloma of anus $\times 15$ diameters.

The adenoid tissue found in purely benign polypus differs structurally in no respect from that found in the most malignant of rectal cancers, the great majority of which are of the adenoid type, except that in the former the tendency is to project into the lumen of the bowel, and become pedunculated; while in the latter the muscularis mucosæ is rapidly perforated, the muscular tissue of the bowel infiltrated, while the ulceration, invasion of surrounding structures, implication of lymphatic glands, and occurrence of metastatic growths, which characterise carcinoma in other parts of the body, become manifest. In some cases of cancer, however, pedunculated growths are met with, but they are unlikely to be confounded with the simple glandular polypus, as the induration of the surrounding structures, the irregularity of the growth, and the discharge, will suffice to make the diagnosis. The way in which this occurs is that as the cancerous infiltration

is destroyed by ulceration, islands of tolerably healthy mucous membrane are left, and these tend to become more pedunculated as the ulceration spreads. We do, however, meet with apparently benign adenomatous growths coexisting with malignant disease.

The section from which Fig. 4 was taken was kindly given me by Dr. Patteson; it was taken from a case in which undoubted rectal cancer was present, with little pedunculated growths of unquestionably benign character, as indicated by the non-involvement of the muscular coats of the bowel; these were situated at some distance from the cancerous ulcer, and were probably caused by the irritation of the discharge from the cancerous ulcer passing over the mucous membrane. I have on more than one occasion seen similar little polypi on the prolapsed mucous membrane of colotomy wounds in cases of rectal cancer.

Papillomata of the anus differ in no respect from similar structures in other parts of the body when covered by scaly epithelium.

Fig. 5 was taken from a typical case, and illustrates very well the structure; they sometimes grow to a considerable size. I have removed one a quarter of a pound in weight. When occurring in the interior of the rectum they are known as villous tumours, but as yet I have been unable to make a minute examination of a well-marked case of this variety.

Myomata are rarely met with in the rectum; they form firm more or less pedunculated growths, originating in the muscular tunic, and having the mucous membrane freely movable over them. I have some sections kindly placed at my disposal by Dr. Macan from a case in which he enucleated a tumour of this nature from the wall of the rectum; it resembles closely the similar tumours so commonly met with in the uterine wall.

Fig. 6.—Lymphoma of rectum $\times 5$ diameters. *a*. Remains of mucous membrane. *b*. Muscular coat of bowel. *c*. Solitary glands much enlarged. *d*. Pedicle.

Fig. 6 (lymphoma) represents a section of a polypus, from a boy aged 6, the subject of a prolapse of the rectum, at the apex of which two small growths, attached by short pedicles, were seen and removed. The general character resembled that of ordinary adenomata, but, upon minute examination, were found to consist almost entirely of lymphoid tissue. Presumably they originated in the solitary glands of the mucous membrane. In the section illustrated apparently three of the solitary glands (*c*) have grown together and greatly increased in size; they appear to have pushed their way through the mucous membrane, small remnants of which may still be seen at several points (*a*) in the section.

Infiltrating lymphosarcoma has been observed in several portions of the intestinal tract, but pedunculated growths—like the one illustrated—unassociated with obvious lymphoid disease in other parts of the body, is, as far as I know, previously unobserved.

Amongst the pathological curiosities which have been found in the rectum we find records of lipomata, teratomata, enchondromata (?), and diffused angioma, which I believe complete the list of benign tumours of this region.

THE name of Frederic Edward Manby, F.R.C.S. Eng., and deputy mayor of Wolverhampton, has been added to the commission of the peace for that county borough.