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Note on the

Pathology and Treatment of Osteomalacia,
With Report of a Case Cured by
Bilateral Oöphorectomy.

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NOTE ON THE
PATHOLOGY AND TREATMENT OF OSTEOMALACIA,
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Case Cured by Bilateral Oöphorectomy.*

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OSTEOMALACIA is a rare disease and is essentially localized in certain countries. As its clinical and pathological symptoms are so absolutely characteristic it is most justifiable to make it a distinct morbid entity. In this note I desire only to report a case of this affection, the only one that has ever come under my observation, and will then make a few remarks regarding the modern pathology and treatment.

CASE.—Mrs. K., aged 39, of Geneva. Menstruated at 16, regularly every month for eight days, blood was considerable in quantity, no pain, no leucorrhœa. Married at 20, has had seven children, the last one about three years before coming to the

hospital. Labors were normal and all the children were brought up on the breast. The patient had always been in good health, and although poor had been well nourished. Eight years previously she occupied a suite of rooms that were so damp that in the morning the bed in which she slept was moist. It was in this suite, which the family inhabited for two years, that the present affection first appeared. The patient commenced by feeling pains in both legs, which rendered walking difficult. She was treated without result for chronic rheumatism. About two months after the beginning of these pains the patient became pregnant for the fifth time; her legs swelled a little, the pains in the legs increased, and towards the end of pregnancy she

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could hardly move about, she did not however keep her bed. After the labor (Nov. 4, 1884), which was normal, the pains diminished without entirely disappearing. Walking became better but difficult. This condition did not change until the commencement of her sixth pregnancy, when the pains became very intense in the legs, pelvis and kidneys. The legs swelled slightly and the last three months of pregnancy were almost entirely passed in bed. After a normal labor (July 22, 1886), the patient was a little better, but walking was more difficult than after the fifth labor, the pains being now steady. Another pregnancy led to a seventh normal labor on June 7, 1888. The patient again suffered, but more severely, from the same symptoms as in the preceding labors, but the pains which disappeared almost entirely after the other labors this time persisted, preventing the patient from sleeping. For about a year the patient experienced, when in bed, a most disagreeable sensation of heat in the legs. The six months previous to her entering the hospital the patient remained almost constantly in bed, and when she walked it was with great difficulty and only with the aid of another person or a chair. Four months before entering the hospital her menses became irregular and excessive without any apparent cause, and two months before she had a menorrhagia of sufficient gravity to call in a physician. Another of less intensity occurred six weeks later. The bowels were regular, the appetite good, but sleep was poor on account of the pains and

sensation of heat in the legs. The patient was often awakened by sudden and violent muscular contractions in the legs. While awake, these involuntary contractions did not occur. The patient entered the Butini Hospital in the service of Dr. E. Kummer on March 29, 1892. The patient is small, thin and sickly looking, the muscles are soft, pulse small, regular, 80 to 90 beats. Systolic bruit, nothing abnormal in the lungs. The abdomen is very prominent on account of a considerable lumbar kyphosis. The abdomen is short because the pelvis and thorax are near together. The liver descends a finger's breadth below the ribs. Above and to the left of the symphysis pubis a hard, round lump is felt, which might be the uterus. Looking at the patient from behind a marked kyphosis is seen, but on close examination this deformity is not so much due to the vertebral column but to a deviation of the sacrum, which appears to be thrown back, while the lumbar vertebral column presents a posterior concavity. The sacrum is as if compressed from above downwards; its point projects forward rather than downwards. The iliac crests are projecting, forming a deep hollow, and by introducing the finger the twelfth rib is found so profoundly engaged in the iliac fossa that it is impossible to penetrate between. The trochanters are normal. The lower extremities are in a slight degree of inward rotation and a slight flexion exists at the knees.

The iliac crests are as if compressed from in front backwards, and in the middle present a convexity, produc-

ing a marked lateral projection. The horizontal branch of the os pubis looks as if pushed towards the middle line, so that the symphysis looks like a projecting beak.

Distance between iliac spines . . .	18 $\frac{1}{4}$ cm.
“ “ “ crests . . .	26 “
“ “ great trochanters . . .	24 $\frac{1}{3}$ “
Bandelocque’s diameter	16 $\frac{3}{4}$ “
Antero-posterior diameter	7 “

Per vaginam, the ascending branches of the pubes are so near together that at their upper part it is impossible to insert the index finger between them. The tuberosities of the ischium only distant two finger’s breath. The coccyx is displaced forward, and reaches a transverse line, uniting the middle of the tuberosities of the ischium. The sacrum presents a deep excavation, and higher up the very projecting promontory is found, allowing hardly the introduction of the finger between it and the pubes. Here the cervix is found, the greater part of which and the entire body of the uterus are above the promontory, out of reach of the exploring finger. The movements of the articulation of the hip joint are as follows: Flexion at 90° produces great pain; abduction is very limited; the knees can only be separated about 9 centimetres; outward rotation is about 10° to 15°; inward rotation on the right none, on the left 5°. The other joint movements are free. Rotation of the shoulders is limited, especially outward. Elbows and hands are normal. The patient experienced pain when she opened her mouth widely, but nothing abnormal was found in the temporo-maxillary artic-

ulation. The cervical region is movable but the dorsal region is limited, and no motion exists in the lumbar region of the vertebral column. The bones of the head and thorax are normal. The pelvis and sides of the thorax are tender on pressure. Height of patient 141 $\frac{1}{2}$ centimetres.

On account of the absolute uselessness of medical treatment, Dr. Kummer decided to perform Fehling’s operation, which was done on April 9, 1892. Median incision, extending from the umbilicus to the symphysis. The intestines were held back by a large pad of gauze, and the uterus easily seized and drawn out with the adnexa. The right ovary and pavilion was tied off with silk and cut away. The peritoneum was united above the surface of section by a single suture. Left ovary removed in a like manner. Three planes of sutures for the abdominal incision.

Pathological examination of the specimens showed that both the ovaries were of medium size and normal shape. The vascular supply appeared normal. In both ovaries several small cysts were found, the largest of which was the size of a small filbert, filled with a light red liquid. In the left ovary a corpus luteum was found, the last menses having taken place a few days before the operation.

The patient rapidly recovered from the operation without any temperature. The following day the pains in the pelvis were less, and only those in the legs remained, but far less intensity. The sensation of heat in the legs has diminished although not entirely absent. Walking is far bet-

ter. The patient was up three weeks after the operation and was able to walk in the hospital yard without a cane, but with difficulty however, and quickly became tired. This is not astonishing, for examination showed that the skeleton was just as deformed as before the operation; the bones only are not painful on pressure. The general condition is far better, appetite is good and the patient has gained in weight.

In order to discover the effect of oöphorectomy on the organic changes, Dr. Paul Binet made quantitative analysis of the patient's urine before and after the operation.

Before Operation.—Urine acid; color No. 3 of Vogel's scale; clear; specific gravity, 1015; no albumen or sugar in pathological quantity. Phosphoric acid, 0.84 gr. per 1000; calcium, 0.05 gr. per 1000.

After Operation.—Slightly acid; color, 2.5; no sugar nor albumen. Phosphoric acid, 0.69 gr. per 1000; calcium, 0.05 gr. per 1000.

Pathological Anatomy and Physiology.—The characteristic lesion of the affection is the decalcification of the normal bone tissue and its consecutive destruction, while rachitism is produced by the absence of calcification of the elements of ossification. In both diseases, there is a change in the marrow; red osteomyelitis in the beginning, while in the advanced stage it is a yellow osteomyelitis. Chemical analysis of the bones in osteomalacia shows a diminution of the phosphate and carbonate of calcium. The studies of Berzelius and Otto Weber show that the phosphate of calcium may be

only from 20 to 2 per cent., while in the normal condition this salt is found in the proportion of from 51 to 83 per cent. According to Mörs and Muck, calcium decreases more than phosphoric acid. Carbonate of calcium, which normally is 12 per cent., decreases to 1, 2, 3, 4 and 5 per cent. This shows that the calcium salts are four or five times less in quantity than in the normal bone. According to Bouchard, the decalcification of the bone plates produces secondary changes in the physical and chemical properties of the ossein. The fundamental substance of the bone plates become clear and hyaline by decalcification, and cannot be transformed into gelatine. Some writers have tried to explain decalcification of the bones by the presence of an acid which dissolves and eliminates the phosphate of calcium. In reality the chemical reaction of the bones is modified; it is neutral and even acid, and lactic acid has been found in the bones in osteomalacia by Schmidt, Weber, Drivon and others. Now what is the manner of production of lactic acid in the bones? For Bouchard, the living organism is constantly making acids, but destroys them under normal conditions. Under the influence of certain morbid conditions, oxydation of organic acids is not so active, or at least these acids accumulate, and pregnancy appears to be one of these conditions. Another theory is the influence of the nervous system, which is astoundingly upheld by the results of castration. For Fehling, osteomalacia in women is produced by an irritation of the vasodilator nerves of the bones, coming

from the ovaries, thus causing hyperemia and resorption of the bony tissue; consequently this disease seen in this light is a trophoneurosis and the theory is based on the following facts:

- (1) Marked increase of the malady coincides with each menstrual epoch:
- (2) the extremely rapid diminution of pains in the diseased parts after ablation of the ovaries; those of the ribs and sternum are lessened usually three days before those of the pelvis;
- (3) the great richness in arteries and veins in the extirpated adnexa, with dilatation of these vessels, as in pregnancy, showing that this is the essential cause of the disease;
- (4) the fecundity of osteomalacia women is very considerable, as the following table will show:

According to Fehling.	5.4
“ “ Eisenhart	6.4
“ “ Baumann	6.8
“ “ Rosenträger	8.2

The mean fecundity in Germany is 3.9.

This great fruitfulness clearly demonstrates the hyperactivity of the ovarian functions, and even when the disease has declared itself, the frequency of pregnancy is still very remarkable. From what has been said I think that the nature of the morbid process resides in a pathological hyperactivity of the functions of the ovaries. Kehrer attributes the disease to an infectious agent, an osteolytic organism, because the disease, like leprosy, etc., appears to be endemic and localized in certain regions. The urinalysis does not throw much light on the pathology of the disease,

and although Lehman, Mommsen and others have found lactic acid present (in the case reported there was none) still nothing certain can be deduced. As to the alkalinity of the blood, put forward by von Jaksch, it may be said that there is nothing absolute in this fact, as in many cases the blood was normal.

Treatment.—I shall pass in silence the medical treatment of osteomalacia, having had no experience in the matter, and will simply speak of oöphorectomy. This operation for the cure of osteomalacia dates back to the Congress at Berlin in 1890, where Fehling reported nine cases cured by castration. The patients were from twenty-eight to fifty years of age; they were all multiparæ and the disease was of long standing; in one of them about thirteen years. Only one died from intestinal strangulation; the other eight recovered rapidly. Fehling's cases were soon added to by Truzzi, Menzinger, Thorn, Hofmeier, and a host of others. When the patient is pregnant, von Velits prefers the Cæsarian operation, completing it by ablation of the ovaries, rather than Porro's, which is more dangerous. In the case of a pregnant woman, aged 41, having a grave osteomalacia, Rasch induced premature labor, delivering twins. As no amelioration in the severe pains was noticed, he performed oöphorectomy with immediate relief and recovery of his patient.

After a careful research in the literature of the subject, an abstract of which would fill a small volume, I would venture the following conclusions:

(1.) If the patient is pregnant, her health in fair condition, allow the pregnancy to go to term. If the pelvis is too much contracted for normal delivery at term, perform

Cæsarian section and ablation of both ovaries.

(2.) In a non-pregnant subject, perform bilateral oophorectomy.

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