

## PARATHYROIDECTOMY FOR ANKYLOSING POLYARTHRITIS \*

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OF THE many pathologic conditions affecting the spinal column, two have been recognized for many years: one, described by Bektereff, termed "stiffness or rigidity of the spine" and the other called by P. Marie "spondylose rhy-somélique." These conditions have been described in literature, being respectively termed Bektereff's disease and Strumpel-Marie's disease. The symptom-complex of the two conditions considered differs in that in Bektereff's disease there is to be noted a bow-shaped kyphosis of the entire spinal column, while in Marie's disease the spine is fixed and erect, usually with an accompanying involvement of the hip- or shoulder-joints. In the case of the former, there is merely a stiffness and rigidity of the spine, while in the latter there is a definite ankylosis, not only of the spine, but of the big joints of the extremities. On careful investigation, the difference between these conditions is a question, apparently, of degree only. This was pointed out by Turner of Leningrad after having studied many preparations of bones he had acquired following the deaths of patients suffering from these conditions. He was able to demonstrate conclusively that if prolonged enough the condition described by Bektereff finally ended in an ankylosis of the spine. Various combinations of stiffness and partial immobility in both the spine, hip, shoulder-joints and ribs have been noted by many observers. Indeed some of the cases I have observed have gone so far as to have complete involvement of all joints of the body. Therefore, the difference between the two conditions is quantitative rather than qualitative. Before reaching the final stage described by Marie they all pass through the stages first of interference with mobility on to complete immobility and finally ankylosis. It is, therefore, suggested that in referring to these conditions a term be used to cover both, such as ankylosing polyarthritis.

It appears evident to me from observations that the kyphosis spoken of by Bektereff is a distortion of the spine, due to the fact that the patient suffering from this condition is still able to walk and work, and that the spine takes this curvature due to the weight of head and shoulders. If, however, the patient is incapacitated and lies in bed continuously, the spinal column becomes ankylosed in a straight or erect position. In three cases under my personal observation, who were apparently suffering from Bektereff's disease with kyphosis and were put to bed and treated orthopædically under an anæsthetic, the spinal columns were straightened and plaster-of-Paris cases applied for two to three months. When removed, the spines were ankylosed

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in a straight position with a similar ankylosis of the hip-joints which had also been encased in the plaster.

Of these patients who have developed ankylosing polyarthritis, one is as a rule able to obtain a history of an infectional process such as scarlet fever, typhoid, spotted fever, acute suppurating osteomyelitis or gonorrhœa, which conditions have immediately preceded the subsequent affection of the spine and of the other joints. It is interesting to note that although these conditions are apparently an infection of the joint following acute inflammatory conditions, sometimes chronic, suppuration does not develop and cause localized joint abscesses but merely terminates in an ankylosis of the affected joint. Puzzling also is the explanation of why some of the patients so affected have their joints finally ankylosed while others do not have this condition occur.

Doctor Belsgorodsky in making detailed and analytical examinations of his patients suffering from ankylosing polyarthritis discovered in all of them an increase of the calcium content of the blood, while Doctor Schraer noted that ordinarily such patients had a reduced electro-excitation of the muscles and Doctor Demidovskaya stated that he had noted in many an increased viscosity of the blood. In the recent data supplied by Doctor Samarin he noted that in 26 patients, whose blood had been examined, 19 showed a lymphocytosis as high as 50 per cent.; of 14 patients examined, 11 showed an increased viscosity of the blood, using the apparatus of Litchikowsky, based upon the time of 5 seconds as normal. In these cases it frequently reached 6 to 7 seconds. On the basis of 4 milliamperes electro-excitation, out of 22 patients, there were 19 who showed a reduction from 5 to 10 milliamperes. In 42 patients in which the calcium content of the serum was determined, 28 showed a definite hypercalcæmia, while 14 had a normal calcium level. Assuming between 9 and 11 milligrams of calcium as the normal, the contents of these varied from between 6 and 15 milligrams per cent.; out of 29 cases in whom the potassium content was investigated, 7 cases showed it increased (from 29 to 37 milligrams per cent. and in 3 cases it was lowered (from 13 to 16 milligrams per cent.). In the remaining, it was normal, indicating that there was no sharp change in the level of the potassium. Finally it was noted by Nekrasoff that the inorganic phosphorus was apparently increased while the organic phosphorus was normal or but slightly increased, assuming 2.8 milligrams per cent. of inorganic phosphorus to be normal, while the average percentage in these cases examined was 3.43.

Therefore, it is to be noted that there is (1) an increase of the level of calcium in the blood, (2) a decrease of electro-excitation of muscles, which findings are just the opposite of those in tetanus in which the calcium level is lowered and the electro-excitation of muscles increased. In tetanus, one notes cramps while in polyarthritis there is a restriction or tightness or stiffness on motion. If we consider tetanus as an expression of hypofunction of the epithelial bodies, then all of the above-mentioned findings in cases of ankylosing polyarthritis would incline us to infer that we are dealing with a hyperfunction of the epithelial bodies. What called my attention more par-

ticularly to the hyperfunction in these cases was the apparent deposit of excessive calcium formation at the foci of inflammation or in diseased joints, and because of the presence of which the inflamed joints pass into a stage of ankylosis after the preliminary stiffness.

Correlating the work of Collip, who showed that the hormone of the parathyroid bodies increased the level of calcium in the blood, with the findings in cases of ankylosing polyarthritis, it appeared evident that my theory of hyperparathyreosis received material support and that, theoretically, this condition is instituted through the infections preceding the development of the joint conditions developing in certain persons possessing a predisposition or constitutional tendency to hyperparathyreosis.

Therefore it appeared to me a logical reasoning that in order to prevent the development of ankylosis or to eliminate preliminary stiffness, it was essential to diminish the hypercalcaemia by destroying a part of the epithelial bodies which were causing this condition in the blood, which, as indicated, appears to originate in the parathyroids.

The operation is, as a rule, ordinarily done under local anæsthesia, incision being made along the front edge of the right sternocleidomastoid muscle. The inferior thyroid artery is first identified and the parathyroids searched for where the inferior thyroid artery enters the thyroid body. There is, as a rule, a lower, small gland and an upper one. In order to be more certain of their removal, the capsule is incised and a portion of the right thyroid gland resected. In some instances, it is to be noted that the parathyroid is incorporated in the substances of the thyroid gland itself, which is at times evidenced in the development of a parathyroid growth in the substance of the thyroid gland (Craft). The microscopical verification of the excised parathyroid bodies shows how difficult it is to recognize them and how difficult and delicate a parathyroidectomy is. We have operated on fifty-five patients. In thirty-three of these cases, Doctor Samarin made microscopical examinations of the tissue removed. In ten cases no parathyroid tissue was found, although in these examinations a complete serial section was not made. Out of the twenty-one patients in which the parathyroid bodies were found to be present, it was noted in only two instances that two parathyroid glands had been extirpated. While it must be evident how important it is to receive a microscopical criterium of the removal of these epithelial bodies, we are also most interested in the resultant chemical change in the blood. This examination should be done within two weeks after the operation but after recovery from any shock which might have been caused by the operation itself. Out of thirty investigations, twenty-seven showed that the postoperative calcium level was in some instances reduced to 1-3 milligrams per cent. Therefore it would appear that the chemical criterium was more illuminating than the microscopical. In addition also, the chemical examination of the blood confirms the fact that in some instances the epithelial bodies were not removed at operation.

The results of the above procedure have been most interesting. As already

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mentioned, these diseased joints go through a stage of stiffness or interference with their mobility, the patient being conscious of a feeling of distress in them and of some limitation of motion. While parathyroidectomy cannot alter the already formed ankyloses, which for their correction require mobilization, still it is advisable to precede such mobilization with parathyroidectomy in order that after manipulation there will not be a predisposition on the part of the patient again to deposit lime in the joint.

Sometimes the most striking effect resulting from this operation is that as early as twenty-six hours after parathyroidectomy this sensation of stiffness has been noted to disappear from one joint after another. If it has affected the shoulders and it is difficult for the patient to lift his arms, they are thereafter easily moved and the patient describes the joint as having become much looser. Even joints with which there was extreme difficulty in motion become progressively and sometimes completely movable. In the hip-joint where it has been impossible for the patient to cross his legs, postoperatively he does it easily. Those with the stiffened spinal columns increase in stature several centimetres because of their ability to make the columns more erect.

Samarin, in summarizing the results in forty-nine cases following parathyroidectomy found no improvement in sixteen and improvement in thirty-three cases. If one takes into consideration the fact that in ankylosing polyarthritis the patient in all probability cannot be cured and has effected only a moderate improvement on the employment of thermal baths, the results of this operation may be considered very encouraging, for it primarily destroys the hypercalcaemia, thereby stopping the process of progressive ankylosis, and this is indeed the most important principle to be effected by the operation. It seems evident, in addition, that the reduction of the hypercalcaemia in some way influences beneficially the function of the voluntary muscles, giving them greater freedom of movement. While the already formed ankyloses remain, it evidently improves the partially immobilized spine without, however, completely straightening it. It is interesting to note, in addition, that in these cases, the muscles of the back show a definite stage of acute atrophy while, on the contrary, those in the front of the body are in the stage of habitual contracture.

These patients require much additional attention after the extirpation of the parathyroids. Primarily in cases of multiple ankylosis of joints, mobilization is indicated. Orthopaedic treatment is essential to overcome the atrophy of the back muscles and to cause the resumption of the erect posture of the spine.

It is, therefore, my desire thus to place before the profession what seems to me to be the aetiological factor in these cases of ankylosis and a procedure which not only appears to be remedial for the stiffness and consciousness of discomfort and immobility of joints but also a method of preventing further ankylosis in cases of ankylosing polyarthritis.