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*Anatomy of Genus Valgum*  
by  
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ON THE ANATOMY OF GENU VALGUM. By EDMUND OWEN, F.R.C.S., *Lecturer on Anatomy at St Mary's Hospital, London.*

AT an October (1877) meeting of the Surgical Society of Paris, M. Verneuil remarked that the cause of genu valgum had been ascribed by various authorities to a pathological condition of the ligaments, of the muscles, or of the bones of the knee-joint; and that as regarded the influence exerted by the bones, some writers, as MM. Ollier and Tripier, considered it to be the result of increased activity in the growth of the internal condyle of the femur, whilst others attributed it to atrophy of the external condyle.

Foremost among the latter class of observers is Professor Humphry, who, in his *Treatise on the Human Skeleton*, published in 1858, wrote (p. 535): "Suppose, however, that the whole surface of the outer condyle has not descended to the same level with that of the inner condyle, or, which is no uncommon thing, has been flattened by the weight of the body; then, although the leg may occupy its natural position when the knee is bent, it will, during extension, slant more outwardly, instead of becoming vertical, and will attain its greatest obliquity when the joint is straight. This is what occurs in cases of 'knock-knee.'" M. Verneuil, on the occasion above referred to, advanced a third theory, which was to the effect that though the deformity was sometimes due to hypertrophy of the internal condyle of the femur, at other times it was the result of an enlargement of the inner tuberosity of the tibia.

The object of this short communication is to show that the atrophy of the articular masses of bone on the outer side of the deformed knee, together with the hypertrophy of the inner tuberosity of the tibia and of the internal condyle of the femur, are the direct result of a slackness of the internal lateral ligament.

To those who account for the deformity by the theory of enlargement of the internal condyle of the femur, one is inclined to put the question, "Why should the internal condyle be more

prone than the external condyle to take on inordinate growth?" The experiments of MM. Ollier and Tripier show that artificial irritation of either femoral condyle will give rise to increased growth of that condyle; in the same way, probably, that the ivory pegs employed in the treatment of ununited fracture cause an excessive development of new bone. But these experiments do not offer a physiological explanation of the *cause* of the enlargement of the internal condyle in knock-kneed subjects. The means of feeding the external condyle are similar to those of feeding the internal condyle; so also with the tuberosities of the tibia. Yet one rarely observes hypertrophy of the outer masses of bone in the knee-joint and atrophy of the inner—conditions which would cause the salient angle of the knee to be directed outwards. The deformity of "bandy-leg" is, in my experience, only exceptionally the result of a want of proper proportion between the articular masses of bone; the outward bowing of the knee being secondary to the curvatures assumed by the femur and tibia. In the out-patient department, at the Hospital for Sick Children, where one meets with an unfortunately large number of bandy-legged patients, I have found but one instance of the deformity resulting from changes in the articulation itself; this was in a girl approaching puberty.

If the deflection of the tibia in genu valgum were due to excessive growth of either the internal condyle of the femur or of the internal tuberosity of the tibia, or of both these masses of bone, the pressure existing between them would be so increased that the internal lateral ligament would be rendered excessively tight. But in many rickety knock-kneed subjects a considerable amount of lateral rocking motion can be obtained in the affected joint, even when the leg is firmly extended upon the thigh. Such movement cannot be imparted to the healthy joint in the position of extension, much less could it exist in a knee whose internal lateral ligament had been rendered tense from increased intra-articular growth of bone. Given a subject whose lower extremities are too weak for the support of the weight which they are called upon to bear, either the bones will bend and possibly give rise to bandy-legs, or the ligaments will yield, and knock-knee, and probably also flat-foot, will be produced. It will be the internal lateral ligament of the knee which will give

way, not the external lateral ligaments, because the latter derive support and security from the tendon-like fascia lata on the outer side of the limb, as well as from the tendon of the biceps itself. The fascia lata descending from the hip-bone to the outer tuberosity of the tibia and to the head of the fibula, and containing all the fibres of insertion of the tensor fasciæ femoris, and two-thirds of those of the glutæus maximus, finds no equivalent on the inner side of the knee. The support afforded by the sartorius and gracilis to the inner side of the knee is relatively and absolutely small. In a well-marked case of knock-knee the important band of fascia, to which attention has just been directed, may be made out, especially when the leg is extended, running like a tight bow-string across the retiring lateral angle of the joint, considerably in front of the tendon of the biceps.

In most knock-kneed children the ligaments throughout the body are markedly weak and lax; but the allied fascia lata and biceps having provided against an outward bowing of an enfeebled knee, an inward falling of the joint may be anticipated. The more the internal lateral ligament yields, the less becomes the pressure between the internal femoral condyle and the inner tuberosity of the tibia. So these masses of young and growing bone, now free of a pressure which should regulate and control their development, grow without restraint into the interior of the articulation. And during this time the outer side of the joint is subjected to a necessarily increased amount of pressure, which moulds and retards the growth of the plastic masses of bone as thoroughly and as surely as does the tight bandaging arrest the growth of the Chinese girl's foot-bones.

The rational treatment, which I apprehend consists in diminishing the pressure borne by the outer side of the deformed joint whilst it increases that on the inner side, the joint being quiescent the while, reproduces a normal condition, provided only that the bones are plastic enough to be still amenable to the moulding influence of the pressure.

