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## Implants for surgery — Usage of the terms “valgus” and “varus” in orthopaedic surgery

*Implants chirurgicaux — Usage des termes «valgus» et «varus» en chirurgie orthopédique*

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The main task of ISO technical committees is to prepare International Standards. In exceptional circumstances a technical committee may propose the publication of a technical report of one of the following types:

- type 1, when the necessary support within the technical committee cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development requiring wider exposure;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical reports are accepted for publication directly by ISO Council. Technical reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 9586 was prepared by Technical Committee ISO/TC 150, *Implants for surgery*. The reasons which led to the decision to publish this document in the form of a Technical Report Type 3 are explained in the Introduction.

# Implants for surgery — Usage of the terms “valgus” and “varus” in orthopaedic surgery

## 0 Introduction

This Type 3 Technical Report has been prepared in order to state the differences in usage of the terms 'valgus' and 'varus' so that anomalies of usage, especially in relation to the hip joint, may be clearly understood and confusion minimized.

The Terminology Working Group (WG 1) of Technical Committee 150 (Implants for Surgery) of the International Organization for Standardization (ISO) has for some years been discussing the terms 'valgus' and 'varus' in an attempt to reach agreed definitions. The terms have been in use for centuries but their meaning seems to have varied from time to time. The present usage has developed in a haphazard manner, such that consistent definition of the terms seems to be impossible.

A discussion paper (document ISO/TC 150/WG 1 N 59) was prepared by ISO/TC 150/WG 1 and circulated widely throughout the world for comment. The results of the study of the comments reveal that the terms are now so ingrained in day-to-day use that it is most unlikely that they can be abandoned or replaced by alternative terms.

This Technical Report has been prepared in order to point out the differences in usage of the terms 'valgus' and 'varus' in orthopaedic surgery.

## 1 Scope and field of application

This Technical Report gives the present usage of the terms 'valgus' and 'varus' in orthopaedic surgery, and describes anomalies of usage in order that they may be clearly understood and confusion minimized.

## 2 Present usage

The terms 'valgus' and 'varus' are used to characterize certain deformities of limbs in the coronal plane of the body. The deformities may be centred on a joint or within the length of a long bone. The terms are mostly used in relation to deformities occurring in the lower limbs, and the only common use in the upper limbs is in relation to the elbow joint following supra-condylar fractures of the humerus, or abnormalities of the lower humeral epiphysis.

The term 'valgus' equates to a movement of abduction, such that the limb distal to the point of deformity is angled away from the median plane of the body in the coronal plane. Conversely, the term 'varus' is used when the part of the limb distal to the deformity is angled towards the median plane and thus equates to the movement of adduction (figure 1). Thus 'genu valgum', meaning a 'valgus' deformity of the knee, results in the limb distal to the knee being angled away from the other limb. 'Tibia vara' indicates that there is a 'varus' deformity of the distal tibia in relation to the proximal tibia.

It should be noted that distal deformity, particularly in a lower limb, tends to be balanced by an opposite deformity in the proximal part of the limb, and perhaps the commonest example of this is where 'hallux valgus' is associated with a 'varus' deformity of the first metatarsal (figure 2). This concept is vital to the understanding of the reasons for the different usage of the terms 'valgus' and 'varus' in relation to the hip joint.

### 3 Anomalies of usage

There are four areas where the use of the terms is anomalous:

#### 3.1 The foot

Normally the foot is considered to be in the horizontal plane of the body and thus, strictly speaking, deformities of the toes should not be characterized by the terms 'valgus' and 'varus'. However, traditional usage is such that it would be impossible to eradicate the terms in this context. 'Hallux valgus' is probably the most common use for the term 'valgus'.

It should be noted that in the instance of the big toe, 'hallux valgus' in fact equates to the movement of adduction of the big toe although it conforms with the definition given above of the toe being angled away from the median plane of the body. The reason for this anomaly is obvious - the terms adduction and abduction in the foot relate to the axis of the foot and not to the median plane of the body.

Also, the terms 'valgus' and 'varus' are used to qualify some deformities of the hind foot. The 'valgus' calcaneum relates to eversion of the subtalar joints and 'varus' calcaneum to inversion, seen when the patient is standing. The deformity may just be postural but may also be caused by some deformity of the bone due to soft tissue imbalance during growth, as in club foot deformity.

#### 3.2 The hip joint

It is in relation to the hip joint and the upper end of the femur that major differences of usage of the terms 'valgus' and 'varus' occur.

The anatomy of the upper end of the femur is rather complicated in that there is an angle between the neck and the shaft of the femur in the intercondylar region which is normally considered to be 130° (figure 3). However, in the anatomical position there is also anterior angulation of the neck in relation to the coronal plane. During X-ray examination of hip joints, the femora are lying in the normal anatomical position, so that the neck is anteverted in relation to the shaft. Thus the neck/shaft