

## CONGENITAL (DEVELOPMENT) ABNORMALITIES OF THE ELBOW JOINT\*

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The Master, ladies and gentlemen

It is the usual practice in a memorial lecture to reflect on the man whom the lecture is meant to commemorate. 'The Life and Time of Sir David Galloway' has been the subject of the first memorial lecture delivered by Dr. Scharff, who was closely associated with Sir David.

Sir David ranks with Manson, Ross and Watson as the great Scotsmen whose contribution to medicine in general and to medicine in this part of the world in particular is a debt we cannot repay.

Arriving in Singapore in 1885 at the age of 27 he took over from Dr. Robertson. With the inception of our medical school in 1905 and his appointment as Lecturer in the Principles and Practice of Medicine in 1908 he fostered the birth of a new era in medicine in this country.

It is hoped that the Galloway Lecture will grow in stature and come to be regarded in the same light as the Hunterian Lecture or the Ghoustonion Oration. With the infusion of new and younger blood into our Academy and the granting of the Letters Patent for a Coat of Arms by Her Majesty the Queen the honour of being a Galloway Lecturer will be the most coveted prize of our graduates.



Fig. 1. Normal elbow.

I am deeply conscious of the honour bestowed upon me by the Academy in appointing me as the Galloway Lecturer for 1963.

In choosing Congenital Abnormalities of the Elbow Joint as the subject for discourse, I hope to interest not only my orthopaedic colleagues but the whole medical profession.

I shall start by showing some normal X-rays of the elbow joint. I shall not go into the anatomy of the joint in detail but beg to remind you that the capitulum ossifies at 3 years and the head of the radius at 5 years (Fig. 1).

### *Anterior dislocation of the radial head*

Mc Farland described this condition in 1936 and recorded eleven cases. All the dislocations were unilateral. Bilateral cases have been recorded and also association of this anomaly with other congenital deformities. In calling this condition congenital one must assume that the absence of a history of trauma is reliable. However Monteggia fracture-dislocations are not uncommon injuries and in the forward or anterior variety the ulna is angulated forwards and the head of the radius dislocates anteriorly. These injuries if untreated will after some years present a picture that is indistinguishable from that of congenital anterior dislocation of the radial head. (Fig. 2).

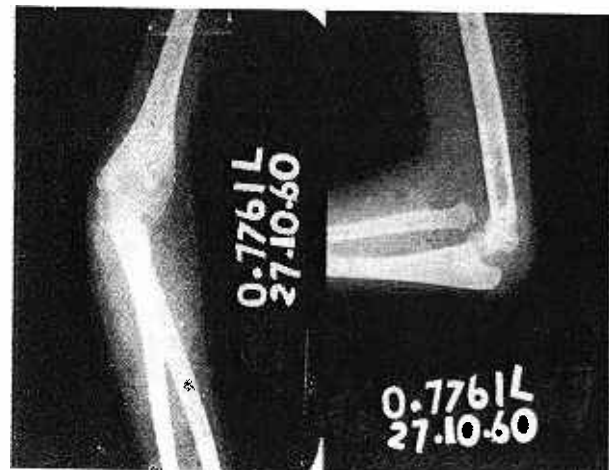


Fig. 2. Anterior dislocation of radial head.

The dome shaped appearance and the smallness of the radial head is due to a failure of moulding of the head by its articulation with the capitulum. There is a reversal of the normal posterior curve of the upper third of the ulna to an anterior curve.

\*Galloway Memorial Lecture (1963) delivered on 27th June, 1963 at Academy of Medicine, Singapore.

Since the disability is minimal, treatment is not required in most instances. Attempts at replacing the head have only caused a stiffness of the elbow. Where flexion is markedly limited, excision of the radial head is performed.

#### *Posterior dislocation of the head of the radius*

Osmond-Clarke believes that this is the true congenital dislocation. Recent reports appear to confirm this view. The occurrence of this condition in families suggests a genetic origin for this anomaly.

This condition can be bilateral or unilateral, but in the unilateral cases the apparently normal elbow shows minor radiographic changes.

There is limitation of rotation of the forearm and extension of the elbow. The head of the radius can be felt posterior to the lateral condyle.

The head is small and deformed. The neck is elongated and articulates with the lateral condyle. There is a slight accentuation of the posterior convexity of the shaft of the upper third of the ulna. The humero-ulnar articulation is itself irregular. (Fig. 3).

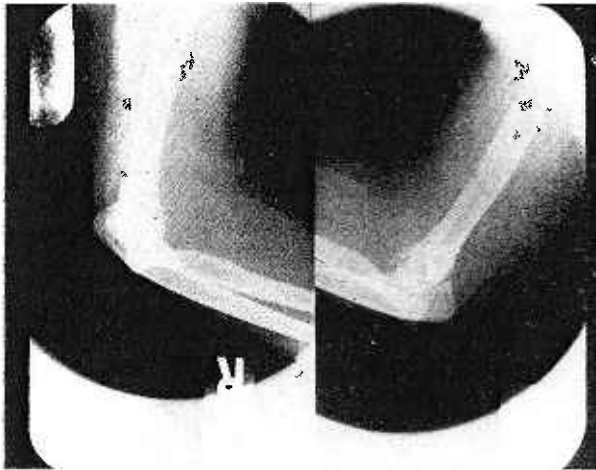


Fig. 3. Bilateral posterior dislocation of radial heads.

Excision of the radial head increases the range of rotation.

*Associated conditions:* Posterior dislocation of the head of the radius is seen with web formation in front of the elbow joint.

In the syndrome of Radial head subluxation—finger nail defect—absent patella and iliac horns the clinical and radiographic appearance of the elbow is indistinguishable from that of a case where only posterior dislocation of the radial head is present.

#### *Synostosis of the radius and ulna*

This condition can be unilateral or bilateral. Mc Farland has divided these into three types. Type I, which is the most severe, shows a complete fusion of the upper end of the radius to the ulna. (Fig. 4). Type II shows a deformed radial head and a bony fusion of the upper third of the radius below the head with the upper third of the shaft of the ulna. (Fig. 5). In Type III, in addition to the malformation of the radial head, there is a thick fibrous band connecting the bones.



Fig. 4. Radio-ulnar synostosis Type I.



Fig. 5. Radio-ulnar synostosis Type II.

The disability is one of rotation. The forearm lies in the mid-position and rotation at the shoulder compensates for the lack of rotation at the elbow.

The etiology appears to be one of failure of longitudinal differentiation. The condition is familial and the heredo-mechanism is either an incomplete dominant or recessive trait.

An interesting feature of this deformity is that it has been reported in a male with xxxxy sex chromosomes (49 in all). The major clinical features here were mental deficiency, undescended testes and bilateral radio-ulnar synostosis. So an orthopaedic surgeon must make a full clinical examination to see if associated abnormalities are present if he is confronted with what appears to be a well known orthopaedic condition.

The results of excision of the upper end of the radius with division of the interosseus membrane and interposition of tissue between the bones have all lead to failure. Rotation is not restored. The condition is best left alone.

#### *Humero-radial synostosis (Fig. 6).*

This is a rare condition due to a failure in segmentation in embryonic life. There is one case on record in our orthopaedic files. In some reports there is a familial history and a dominant allele in heterozygous form appears to be the cause. There is no elbow movement and no rotation of the forearm. These patients though unable to perform certain movements can nevertheless lead useful lives. Surgery will not restore any movement but osteotomy may be performed to place the limb in the most useful position.

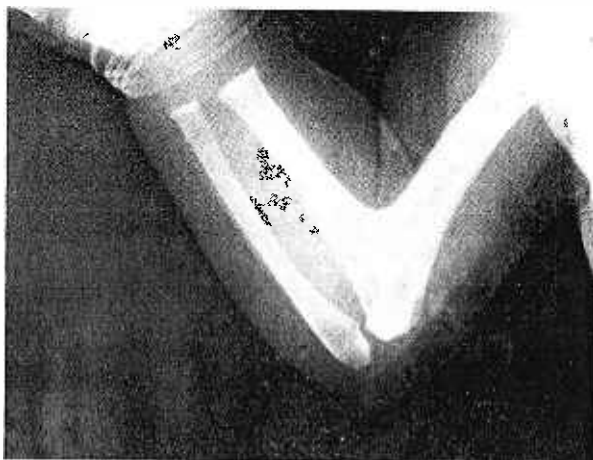


Fig. 6. Humero-radial synostosis.

#### *Patella Cubiti*

Accessory bones in the region of the elbow are rare and of these the patella cubiti over the dorsal aspect of the lower end of the humerus is the one that has been well substantiated.

It has been shown that this can be a true sesamoid bone in the triceps tendon as the patella is the sesamoid bone in the quadriceps tendon. Articular cartilage has been found to underlie the bone. (Fig. 7).



Fig. 7. Patella cubiti.

Ossification around the elbow can however arise from trauma. This condition may be an olecranon spur—like the spur seen in the tendo achilles. It could be a calcareous bursitis or it may even be the epiphysis of the olecranon process that has failed to unite with the body of the ulna.

Other accessory bones around the elbow that have been reported are fabellae cubiti (bilateral antecubital ossicles) and the persistence of the medial or lateral epicondyles.

Excision is only needed if symptoms such as pain or friction neuritis (of the ulnar nerve) arises.

#### *The Elbow Joint in Apert's Acrocephalosyndactylism*

The literature mentions that in this syndrome there is a minimal limitation of movements at the elbow joint. In a study of five cases of this syndrome in Singapore it was noticed that there were typical radiographic changes in the elbow from which a diagnosis of "Apert's syndrome" could be made.

The head of the radius which should appear at about 5 years of age does not appear till per-

haps around 15 years when in one elbow a small centre is seen. (Fig. 8).

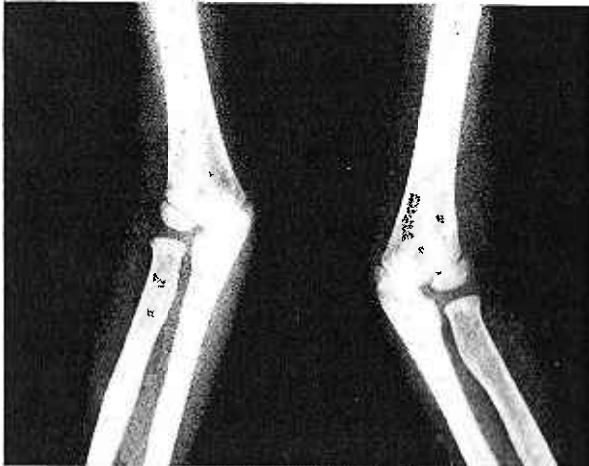


Fig. 8. Elbow in a 10 years old patient with Apert's syndrome. No centre for radial head.

In the younger children affected there is a subluxation of the superior radio-ulnar joint. Moreover there is a delay in ossification of the lateral condyle of the humerus which ossifies at 3 years. (Fig. 9).

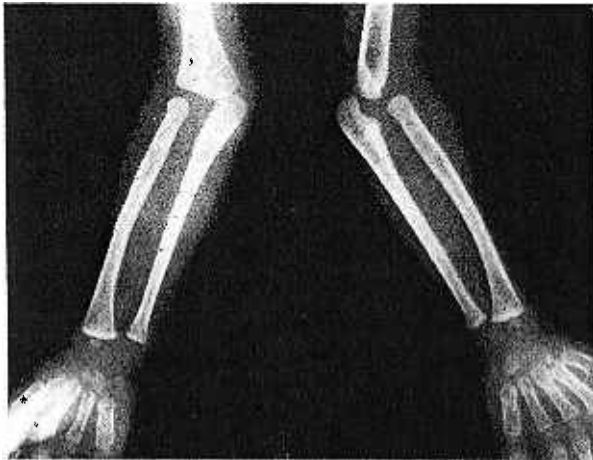


Fig. 9. Apert's syndrome. Elbow in 4 years old patient. No centre for lateral condyle and subluxation of superior radio-ulnar joint.

This delay in ossification is also seen in other regions e.g. in the tarsus where in the boy aged 4, only the talus, calcaneum and cuboid are visualised on X-ray. These centres are present at birth though sometimes the centre for the cuboid appears soon after birth.

It is the study of Acrocephalosyndactylism that stimulated my interest in abnormal elbows. These elbow signs have not been previously recorded in the literature.

#### *Cleido-Cranial Dysostosis*

In a study of three cases affected by this condition no changes in the elbows were seen by

me. However there is mention in the literature of radial head dislocation and aplasia of the lateral humeral condyle in some patients afflicted by this hereditary syndrome.

#### *New mutations affecting the elbow.*

Under this heading I would like to mention two conditions (1) Aplasia of the Trochlea or congenital humero-ulnar dislocation and (2) a syndrome to be published by me under the title of Hereditary Ophtho-mandibulo-melic dysplasia.

In *Aplasia of the Trochlea* which was reported only recently as affecting five members of one family there is present a web formation in front of the elbow that has been seen to be associated with a posterior dislocation of the head of the radius. Here however there is a marked deformity of the medial part of the lower end of the humerus with no trochlea or medial epicondyle. There radial head remains in articulation with the capitulum but the ulna is displaced medially and proximally.

In *Hereditary Ophtho-mandibulo-melic dysplasia* three members of a family (the father, the only son and the only daughter) are affected. There is present blindness from corneal opacities and temporo-mandibular fusion. The limb deformities affect the elbows, wrists, hands, knees and legs.

In the elbow there is aplasia of the lateral condyle of the humerus with humero-radial dislocation. The head of the radius is also aplastic and the upper end of the radius lies posterolateral and proximal to the lower end of the humerus.

The radius is bowed and short and the ulna markedly short. There is no ossific centre for the lower end of the ulna (normally seen at 5 years). (Fig. 10).

A cursory examination of any one of these patients gives the impression that this is merely arthrogryposis multiplex congenita. However a closer examination of the patient and the familial history, combined with skeletal survey leaves one in no doubt that this is not arthrogryposis but a new hereditary syndrome in which there is a widespread mesenchymal defect.

Chromosomal studies have been undertaken and no abnormality was found in the chromosomes. However it is certain that this is a new mutation with dominant inheritance.

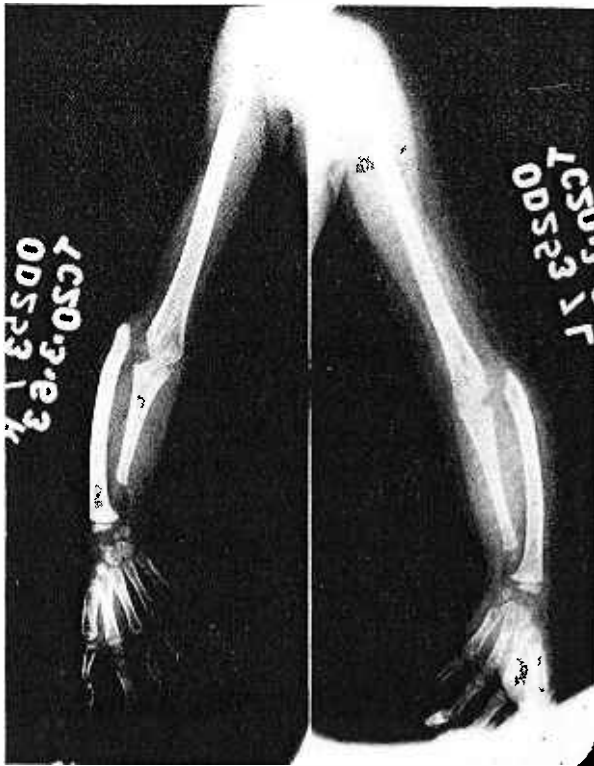


Fig. 10. The elbows in Ophthalmo-mandibulo-melic dysplasia (A new hereditary syndrome).

Reflecting on these conditions that I have described one finds that genetics is a study that cannot be neglected by the clinicians. In all

congenital abnormalities chromosomal studies should be done. Even the poor orthopaedic surgeon who has no special aptitude for the subject is becoming drawn into it.

In conclusion I would like to thank you very much for your kind attention.

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