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SECONDARY DYSPLASIA AND OSTEOARTHROSIS OF THE HIP JOINT IN FUNCTIONAL AND IN FIXED OBLIQUITY OF THE PELVIS

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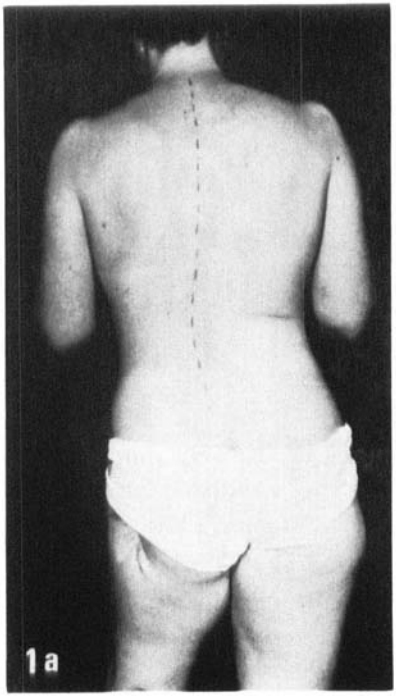
A diference in leg-length usually leads to tilting of the pelvis and to a compensatory bowing of the lumbar spine. The alteration of spine biomechanics may cause low backache (Rush & Steiner 1946, Nichols 1960) and may even be of significance in the development of degenerative changes in the spine (Morscher 1972). However, different opinions on this subject do exist; thus, Hult (1954) found no correlation between symptoms from the lumbar spine and pelvic tilt. Also the knee joint of the longer limb may be exposed to early and severe damage in leg-length disparity (Dixon & Campbell-Smith 1969).

The purpose of the present paper is to present some cases with secondary changes in the hip joint on the side of the longer leg in long-lasting functional as well as in fixed pelvic obliquity.

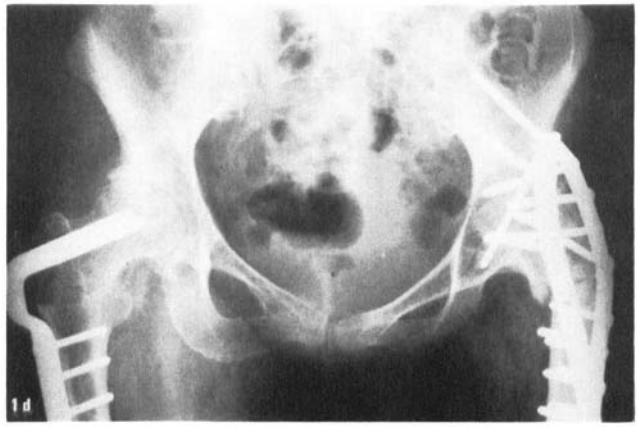
CASE REPORTS

Case 1 (Figure 1 a–d). Woman born in 1925. She had osteomyelitis in the left hip and knee at 10 years of age. When first seen in our clinic in 1960, 35 years old, a pelvic tilt and a compensatory bowing of the spine was present (1 a). The left hip was anchylotic in 23° of abduction (1 b), but the right hip was normal with an anatomical CE angle of 30°. Functionally, however, the angle was only 10°. A corrective osteotomy was recommended, but the patient refused. 10 years later (1 c) a marked subluxation and osteoarthrosis had developed in the right hip. Osteotomies were now accepted in both hips (1 d).

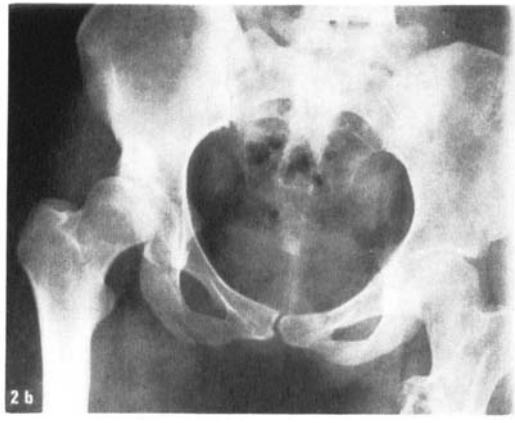
Case 2 (Figure 2 a–e). Woman born in 1930. She had multiple enchondroma, and a considerable difference in leg-length developed in childhood. X-ray at 12 years of age (2 a) shows the functional adduction position in the right hip and a CE angle of 2° (anatomically 20°). She continued to walk without correction of the leg-length disparity which at the age of 24 years was 17 cm. X-ray then showed a definite acetabular dysplasia and incipient coxarthrosis (2 b). She was given a



leg-prosthesis, which was used very little during subsequent years. The degenerative disorder increased (2 c–d), and later an adequate correction of the length disparity was accepted (2 e).


1 d


2 a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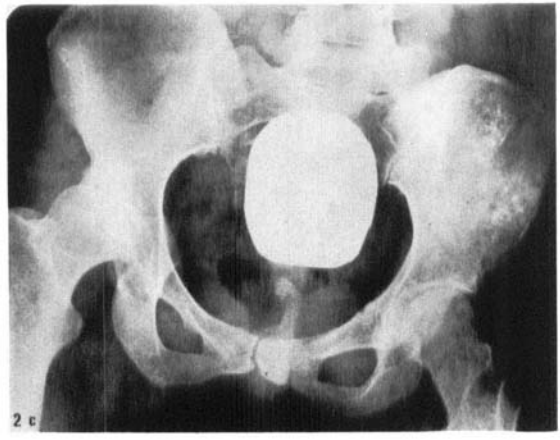
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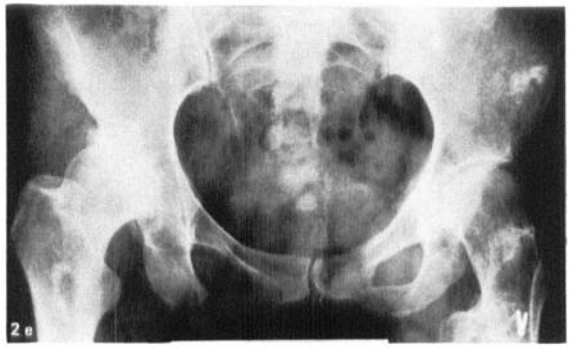
2 d


2 e

Case 3. (Figure 3 a–d). Boy born in 1954. At the age of 2 years, a 3 cm shortening of the right leg was found owing to a hypoplasia of the femur (3 a). Movements and x-rays of the hips were normal. At the age of 8 years, the difference in leg length was 4 cm, and the hips were still normal (3 b). At 13 years of age, the right limb was 6 cm shorter than the left. He had used an insufficient correction and x-ray showed dysplasia of the acetabulum (3 c). Epiphysiodesis of the left femur was performed. At the age of 16 years dysplasia and subluxation of the hip was present (3 d), and a varus osteotomy was done.

Case 4 (Figure 4 a–b). Girl born in 1958. She had a hypertrophy of the left limb owing to a vascular malformation (Klippel-Trenaunay syndrome). At the age of 4 years the difference in leg length was 2 cm, and the hips were normal (4 a). Ten years later the left leg was found to be 3.5 cm longer than the right. She had used an insufficient correction for the length difference, and x-ray showed definite dysplasia and subluxation of the left hip (4 b). An osteotomy was now performed.

Case 5 (Figure 5). Boy born in 1962 with a congenital bowing of the right tibia. At the age of 3 years nevrofibromatosis Recklinghausen was also diagnosed, and at eight a structural scoliosis of the thoracic spine was observed. At the age of one year the right tibia was operated upon because of pseudarthrosis, but union failed. During the following years he walked with a splint without sufficient correction of the leg-length inequality, which at 11 years was found to be 8.5 cm. X-ray showed dysplasia and subluxation of the left hip.

Case 6 (Figure 6). Woman aged 21 years. In early infancy she had a fever illness supposed to be poliomyelitis of moderate degree. At examination a 2 cm tilt (to the right) of the pelvis was found. Hip movements were unrestricted, but a slight paresis of the abductor muscles was found in the right hip and also of the anterior tibial muscles. She had no paresis of the left leg. X-ray showed slight dysplasia in the left hip; CE angle 18° (functional 15°) as compared to 26° in the opposite hip.

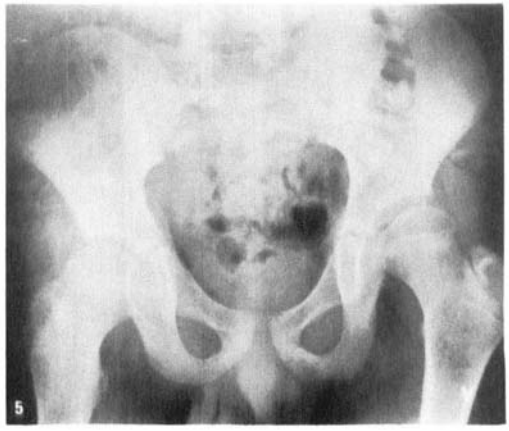
Case 7 (Figure 7). Boy born in 1958. A leg-length disparity of 2 cm was found in 1969 at a routine examination of school children. Two years later the difference in leg-length was 2.5 cm. He had no symptoms or any disturbed function. X-ray showed pelvic tilt and a slight dysplasia of the right hip with an anatomical CE angle of 15° as compared to 21° in the left hip.

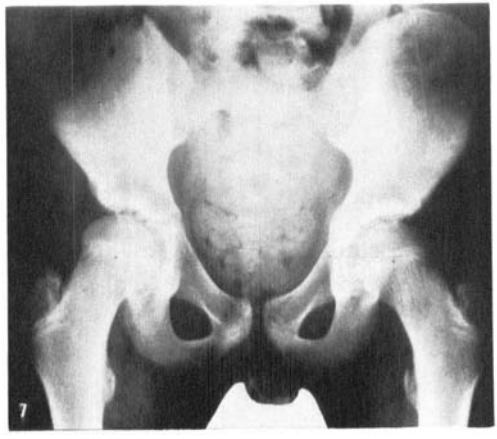
DISCUSSION

Seven cases with pelvic tilt are recorded. Six had leg-length disparity of varying degrees, from two to seventeen cm, and one had a fixed pelvic obliquity after ankylosis of one hip in abduction. The asym-

metrical hip function started at various ages, from early infancy up to 10 years. In some of the cases early x-rays are not available, but none of the cases are suspected of having a primary disorder of the hip in question.

The present material clearly shows that secondary changes may develop in the hip of the longer leg, i.e. in the hip held in adduction





during the growing age. The changes; acetabular dysplasia, subluxation, and subsequent osteoarthrosis are similar to those which are seen in congenital dysplasia of the hip joint.

Tilting of the pelvis leads to an adduction of the hip joint and to a decreased acetabular covering of the femoral head on the side of the longer leg. The functional CE angle is reduced in the adducted hip, the loaded area will decrease, and the stress per square cm will increase owing to the tilting. The correlation between limb shortening, CE angle and loaded area was calculated by Krakovits (1967) who found that a leg-length disparity of, for instance, 4 cm leads to a decrease in the CE angle of about 9° and to a decrease in the loaded area of about 4 square cm when the distance between the centres of the femoral heads is 25 cm. Furthermore, Merchant (1965) showed that the abductor muscle force is greatest with the pelvis in adduction. Consequently the adducted hip is exposed to a considerably increased stress. In addition, the direction of the resultant force in the hip joint is displaced towards the outer part of the acetabulum.

The stato-dynamic changes mentioned are most probably the reasons for the remodelling of the acetabulum, the subluxation and the osteoarthrosis of the hip joints in some of the cases presented. Gofton (1970) is of the opinion that leg-length inequality may be a major contributing factor in the development of unilateral osteoarthrosis of the hip.

Experiments in growing animals have shown that maintaining of the hind limb in inward rotation or extension for a few weeks leads to remodelling of the hip joint and even dislocation (Wilkinson 1962, Sijbrandij 1963, Salter 1966). Also immobilization of the knee joint in extension leads to dislocation of the hip joint in growing rabbits when the hamstring muscles are intact (Michelsson & Langenskiøld 1972).

The present clinical observations as well as the experiments in animals support the opinion that postnatal environmental factors acting in the first few months of life during rapid growth may be of significance in the development of congenital dysplasia of the hip joint (Ilfeld 1962, Ryder et al. 1962, Bjerkreim 1974).

To prevent subluxation and degenerative changes in the hip joint it seems important to level the pelvis in patients with leg-length inequality.

SUMMARY

Seven cases showing secondary changes of the adducted hip in pelvic tilt have been reported. The affection varies from slight dysplasia to severe subluxation and arthrosis of the hip. Adjustment of the existing leg-length inequality is recommended.

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