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SHORT COMMUNICATIONS

Hyperostosis of the Spine in Diabetes Mellitus and Acromegaly

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Summary. A series of 658 patients routinely examined in a medical clinic was studied for senile ankylosing hyperostosis of the spine. The disease was diagnosed from lateral views of the thorax, typical bridges between the vertebrae being regarded as the criterion. A total of 510 patients had diabetes mellitus, and hyperostosis was detected in 13 per cent of these. In the range 60–69 years there was a very significant difference between 122 diabetics and 148 non-diabetics in regard to the occurrence of hyperostosis. — In a series of 21 patients with acromegaly hyperostosis was detected in 6 cases. Eight patients were over 50 years old. Of these, 4 showed hyperostosis and 2 of the latter had diabetes. The results seem to indicate that the growth hormone may play a part in the development of hyperostosis. This observation is significant also from the standpoint of clinical practice.

Hyperostose de la colonne vertébrale dans le diabète sucré et l'acromégalie.

Résumé. Un groupe de 658 patients, régulièrement examinés dans une clinique médicale, a été étudié pour hyperostose sénile ankylosante de la colonne vertébrale. La maladie a été diagnostiquée d'après des vues latérales du thorax, des ponts typiques entre les vertèbres étant considérés comme critères. 510 patients au total avaient un diabète sucré, et l'hyperostose fut décelée chez 13% d'entre eux. Parmi les patients âgés de 60 à 69 ans il y avait une différence très significative entre les 122 diabétiques et les 148 non diabétiques en ce qui concerne la fréquence de l'hyperostose. — Dans un groupe de 21 patients atteints d'acromégalie, l'hyperostose a été décelée dans 6 cas. Huit patients avaient plus de 50 ans. Parmi ceux-ci, 4 présentaient de l'hyperostose et 2 de ces derniers avaient un diabète. Les résultats semblent indiquer que l'hormone de croissance peut jouer un rôle dans le développement de l'hyperostose. Cette observation est également importante du point de vue de la pratique clinique.

Hyperostosis der Wirbelsäule bei Diabetes mellitus und Akromegalie.

Zusammenfassung. Bei einer Gruppe von 658 routinemäßig in einer medizinischen Klinik untersuchten Patienten wurde besonderes Augenmerk auf eine senile ankylosierende Hyperostose der Wirbelsäule gerichtet. Die Diagnose wurde aus der seitlichen Thoraxansicht gestellt, wobei die typischen Brückenbildungen zwischen den Wirbeln als Kriterium angesehen werden. Insgesamt hatten 510 Patienten Diabetes mellitus, bei denen in 13% eine Hyperostose festgestellt wurde. Im Bezug auf die Häufigkeit der Erkrankung bestand bei den Patienten zwischen 60 und 69 Jahren zwischen 122 Diabetikern und 148 Nichtdiabetikern ein signifikanter Unterschied. — Bei einer Gruppe von 21 Patienten mit Akromegalie fanden sich 6 Fälle einer Hyperostose. Acht Patienten waren über 50 Jahre alt. Von diesen zeigten 4 eine Hyperostose, 2 davon außerdem einen Diabetes. Die Ergebnisse scheinen zu zeigen, daß möglicherweise das Wachstumshormon eine Rolle in der Entwicklung der Hyperostose spielt. Diese Beobachtung ist auch vom Standpunkt der klinischen Praxis bedeutsam.

Diabetes is a metabolic disease in which systemic symptoms, e.g. impaired circulation resulting from angiopathy, occur in the late stages (WHITE, 1965). Furthermore, antibodies to the gastric mucosa and the thyroid have been demonstrated (MOORE and NEILSON, 1963). It is known that diabetes may lead to the development of arthropathy (OHLSEN, 1963; AZEROD et al., 1963; ANDERSCH et al., 1963). Certain observations seem to indicate that the new formation of bone tissue is slower than normal in diabetics, even if osteoporosis is not present (KLEIN et al., 1964).

Among the degenerative changes of the spine, so-called senile ankylosing hyperostosis (or only hyperostosis) has been recognized for some 15 years. The main feature in this condition is the formation of bony bridges between the anterior surfaces of the thoracic vertebrae (Th 2—12). The anterior longitudinal ligament is ossified (AUFDERMAUR, 1955), or the bridges border the ligament (FORESTIER and ROTES-QUEROL, 1951). The disease causes only slight discomfort, and the patients are mostly men over 60 years of age (FORESTIER and ROTES-QUEROL, 1951; AUFDERMAUR, 1955; OTT et al., 1963; BICK, 1963; MÜLLER, 1963). It is striking that manifest or latent diabetes was observed in about 50 per cent of the patients with hyperostosis treated in a hospital for rheumatic diseases (OTT et al., 1963 and HAJKOVA et al., 1965). Hence, it seemed to be of interest to investigate the occurrence of hyperostosis in a series of diabetics from a hospital for internal disease.

Material and Methods

The series consisted of 658 patients admitted to the Second Medical Clinic during the years 1961—1964. Apart from other examinations, the following studies were made: 1. determination of fasting blood glucose by an enzymatic method (LEVIN and LINDE, 1962) and determination of urinary glucose; 2. roentgenography of the thorax including a lateral view.

Diabetes mellitus was diagnosed in 510 cases. The mean age of the patients was 53.1 years, and 62 per cent were women. A group of 148 patients was used

as the control. Their mean age was 64.2 years and 52 per cent were women. In this group cardiovascular disease was present in 62 cases, diseases of the lung in 16, gastro-intestinal disorders in 19, disorders of the urogenital tract in 15, endocrinological diseases in 15, disorders of the haematopoietic system in 14 and some other disease in 7.

Furthermore, a series of 21 patients with acromegaly was collected. Of these, 11 had been treated at the Institute for Radiation Therapy (Head: Prof. S. MUSTAKALLIO, M.D.). All these patients showed the peripheral clinical features of acromegaly. In 20 cases the roentgenograms revealed enlargement of the sella turcica. Blood glucose was measured in 18 cases. Five patients were found to be diabetics. The mean duration of symptoms of acromegaly was 10 years. The mean age of the patients was 44.7 years and 15 were women.

Hyperostosis of the spine was evaluated separately on the basis of a lateral view of the chest. If bridges were detected, hyperostosis was considered to be present (Fig. 2).

Results

Among the 510 diabetics investigated, 66 (13 per cent) exhibited bridges of the hyperostotic type in the thoracic spine. Of these patients 70 per cent were women. Fig. 1 shows the age distribution of the patients with hyperostosis. In the age group 60—69 years, comprising 122 diabetics with a mean age of 64.7 years and 67 per cent women, hyperostosis was observed in 21 per cent. In the corresponding control group, comprising 148 nondiabetics with a mean age of 64.2 years and 51 per cent women, hyperostosis was detected in 4 per cent. The difference between the diabetics and the controls is highly significant ($P < 0.001$).

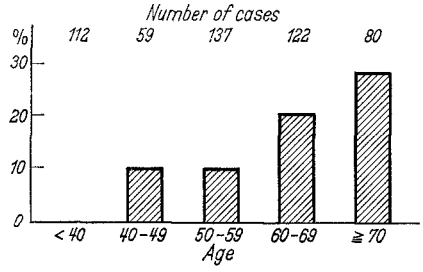


Fig. 1. Hyperostosis of the Spine in Per Cent in Different Age Groups in a Series of 510 Diabetics

Table 1 shows the main symptoms associated with diabetes in the patients showing hyperostosis and in those free from this condition. Insulin therapy was given to 17 per cent of the former and 50 per cent of the latter. Ketonuria was observed in 2 and 24 per cent, respectively. Otherwise there were no noteworthy clinical differences between the two groups, nor did they differ in regard to overweight.

Table 2 shows the results in the acromegaly series. Eight patients were over 50 years old, their mean age being 58 years. Of these, 4 exhibited hyperostosis, and 2 of them also had diabetes. The youngest patient showing acromegaly and hyperostosis was 35 years of age.

Table 1. *Main Clinical Data in Diabetics with and without Hyperostosis of the Spine*

	Diabetics with hyperostosis 66 cases	Other diabetics 444 cases
Mean Duration of treatment for diabetes	4.1 y.	5.6 y.
Mode of treatment:		
— insulin	17%	50%
— oral hypoglycaemic compounds	59%	32%
— diet	24%	18%
Ketonuria	2%	24%
Latent diabetes	12%	9%
Retino- or nephropathy	3%	10%
Neuropathy	5%	2%
Associated diseases:		
— rheumatoid arthritis	1 case	3%
— ankylosing spondylitis	1 case	3 cases
— systemic lupus eryth.	—	3 cases

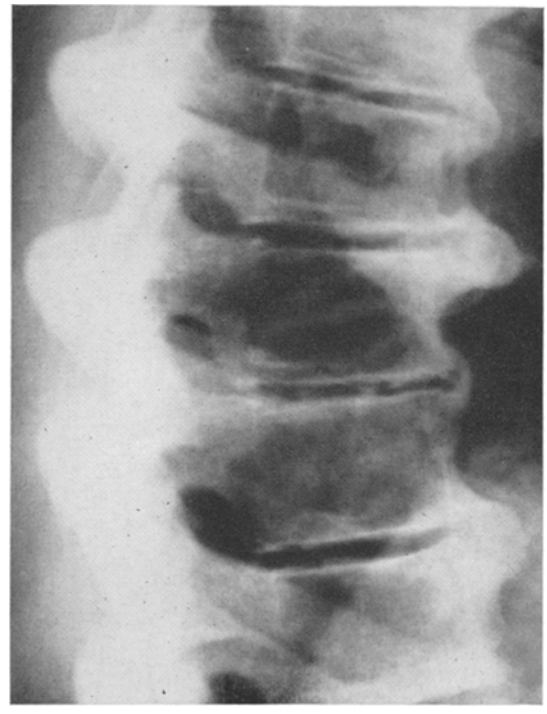
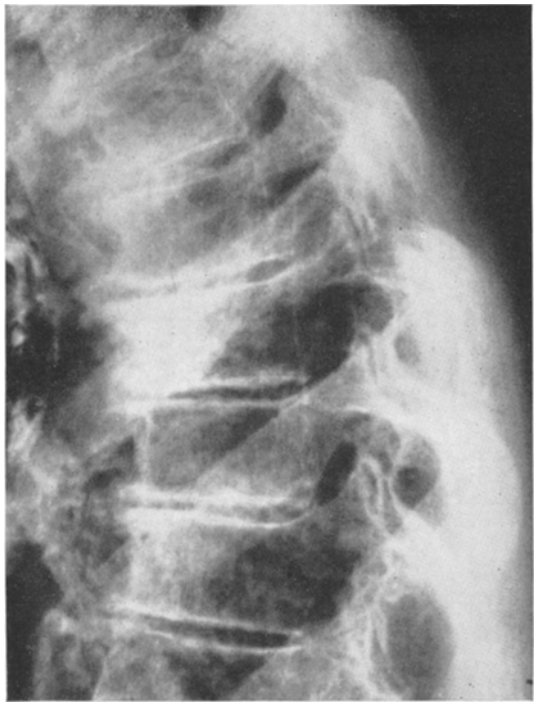


Fig. 2. Bridges in the thoracic spine in senile ankylosing hyperostosis

Table 2. *Hyperostosis of the spine in 21 cases of acromegaly*

	Age group under 50	over 50
Number of cases	13	8
Hyperostosis of the spine	2	4
— diabetes	1	2



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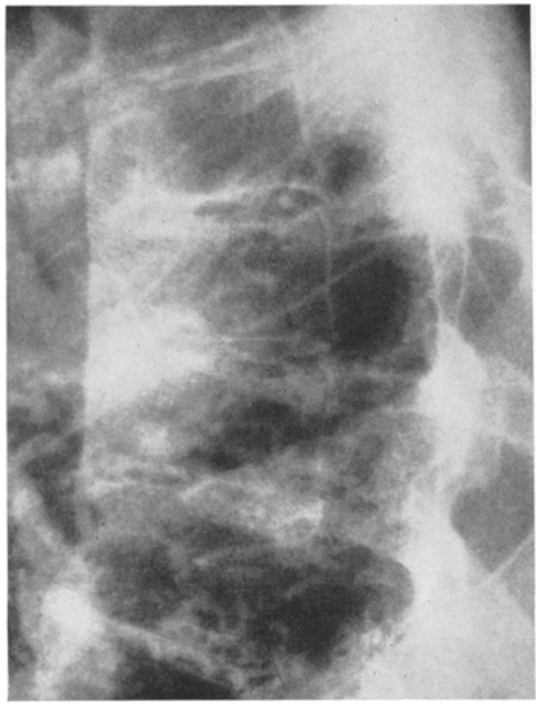

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Fig. 3, 4. Development of bridges of hyperostotic spondylosis in a case of acromegaly and diabetes. First symptoms of acromegaly at 43

Discussion

In the differential diagnosis of hyperostosis the alternatives are ankylosing spondylitis and the paravertebral ossification occurring in conjunction with psoriasis in patients treated with corticosteroids (BYWATERS and ST. DIXON, 1965). In ankylosing spondylitis sacro-iliac changes are observed, the vertebrae are square-shaped, and the syndesmophytes are best seen in anteroposterior projection of the spine. In hyperostosis the anterior longitudinal ligament is ossified, which leads to bone formation also on the anterior surfaces of the middle parts of the vertebrae. This phenomenon does not occur in ankylosing spondylitis. One patient in the present series showed both ankylosing spondylitis, with ossification of the sacro-iliac articulation, and hyperostosis. The ossification observable in connection with psoriasis involves the lateral aspects of the vertebrae and is thus distinguishable from hyperostosis. In this series there was one case of psoriasis concurrent with hyperostosis. Hypoparathyroidism was not observed in any of the present cases. As may be seen in Table 1, inflammatory collagenous disease played no part in the development of hyperostosis.

In regard to the causes that may be responsible for the development of hyperostosis in diabetics at an earlier age than in other patients, it should be emphasized that the present patients with hyperostosis had slight diabetes and had been under treatment for a shorter period than the remainder of the diabetics. Thus there was no positive correlation between hyperostosis and the degree of severity of diabetes. Hence, the causes of hyperosthosis are obviously not to be found among the factors associated with glucose metabolism. It seems possible that a disturbance in the synthesis of mucopolysaccharides, which constitute an element of the collagen fibres of the ligaments, is a causative factor. Such a disturbance has been observed in diabetes (WILLIAMS, 1962). It may also be suggested that an increase in growth hormone is involved (EHRLICH and RANDLE, 1961; GOTH et al., 1963), owing to which the growth of the osteophytes of "physiological" spondylosis is intensified to the degree of hyperostosis. In order to study this point the present series of acromegaly patients was collected, in which hyperostosis was detected in 4 out of 8 patients over 50 years old (Table 2). The result may be regarded as evidence in favour of the view that growth hormone may play a part in the development of hyperostosis. For clarification of this possibility further studies are required.

In the control series hyperostosis was observed in 6 cases. The blood glucose values of these patients were between 75 and 95 mg%. In one case an oral glucose tolerance test was performed, which yielded a normal result. Two of the patients in question were considerably overweight (28—40 kg), however, and one of these had a close relative who was a diabetic.

The results obtained seem to indicate that hyperostosis of the spine is a factor of major importance in clinical practice and ought to be taken into account in roentgenological examinations. In cases showing hyperostosis, determination of the glucose metabolism is

indicated, and the possibility of acromegaly should be considered.

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