OSTEOPHYTOSIS OF THE LUMBAR SPINE

A COMPARISON BETWEEN THE INCIDENCE IN SASKATCHEWAN, CANADA, AND BRISTOL, ENGLAND

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The condition usually referred to as osteo-arthritis of the spine is extremely common and is usually diagnosed radiologically by the presence of spurs of bone arising from adjacent margins of vertebral bodies. The term osteo-arthritis is not desirable, as the joint between the vertebral bodies is a syndesmosis and the true diarthrodial joints of the spine are situated posteriorly. Recognizing this, workers have given the condition a variety of other names such as spondylitis, spondylitis deformans, spondylosis, and spondylosis deformans. Shore (1934) called it polyspondylitis marginalis osteophytica, but the simple descriptive term "osteophytosis" as used by Collins (1949) seems more satisfactory.

There is some doubt as to whether osteophytosis gives rise to any symptoms, but recent reports by Brain (1948), Knight (1948), Bull (1948), Spillane and Lloyd (1951), Bedford and others (1952), and other workers, suggest that it may sometimes be responsible for certain obscure myelopathies in elderly people. However, it is difficult to correlate such reports with the fact that the condition is demonstrated so frequently on routine radiography when there are no related symptoms. It is rarely found before the age of 40 years, but thereafter occurs with increasing frequency. The male sex is more frequently affected. Schmorl and Junghanns (1932) discovered spinal osteophytes in 90 per cent. of all men over 50 years of age, and in 90 per cent. of all women over 60; in the 4,253 spines dissected, the incidence was 10 per cent. in the third decade, 35 per cent. in the fourth decade, and 70 per cent. in the fifth decade.

Osteophytosis is found most commonly in the cervical and lumbar regions but the site of the lesion appears to bear no relationship to those inter-vertebral joints which carry most of the weight of the body (Shore, 1934).

There appear to be no reports available in the

literature on the relative incidence of this condition in various parts of the world. It was noted that the presence of osteophytosis of the lumbar spine appeared to be extremely common in Saskatchewan, Canada. For this reason a detailed study has been undertaken to compare the incidence and severity in England and Canada.

Material

An unselected group of 961 x-ray films taken in Canada during the year 1950 was subdivided according to age, sex, and the degree of osteophytosis, and similar unselected series of x-ray films taken in England was subsequently assembled. The number and sex of the patients in each age group examined in Canada being known, an examination of routine films taken in England in 1949 was carried out in chronological order, until precisely the same number in each age group had been collected. Once the same number of examples in a particular age group had been seen, no further films in that group were included. This method ensured a random selection in both series. For the most part the films were those of city dwellers of a similar social class, but it was impossible to determine the occupation in each individual case.

Radiographs

It was found that a satisfactory view of the lumbar spine was obtained from examinations with the barium meal, barium enema, pyelogram, and straight x ray of the abdomen, and these radiographs were used in both the Canadian and Bristol cases. Films taken specifically to show the lumbar spine were not included.

Although the standards for the degree of osteophytosis are somewhat arbitrary, the same standards apply to both series, and the comparison was made within a period of 6 months by the same observer.

Minimal changes ($\pm$) were recorded when slight lipping or spurring occurred on the adjacent margins of one joint at one or both sides.

Definite changes (+) were recorded when spurring occurred at more than one joint, unilaterally or bilaterally, the spur not exceeding one-quarter of the breadth of the vertebral body.

Moderate changes (++) were recorded when the

spurring was present at more than one joint, the spur exceeding one-quarter of the breadth of the vertebral body but not exceeding one-half.

Gross changes (+++) were recorded when spurs were present at more than one point and exceeded one-half of the breadth of the vertebral body.

Using these standards little difficulty was experienced in deciding the degree of osteophytosis present.

Results

The results of this investigation are shown in the Table. Some observations of previous workers are confirmed by these findings. The condition appears earlier in the male sex and its incidence gradually increases with advancing age. Thus, in the 40 to 45 age group, 47 per cent. of males are affected and 31 per cent. of females. The number of males unaffected drops from 43 per cent. in the 40 to 45 age group to 2 per cent. in ages over 70, while the number of females unaffected drops from 69 per cent. in the 40 to 45 age group to 10 per cent. in the ages over 70. Females generally are not affected as frequently or as severely as males. Thus, in the 61 to 65 age group 67 per cent. of males show changes of + or more but only 41 per cent. of females.

The important finding in comparing the incidence of lumbar osteophytosis in the two countries is that the condition appears more frequently and more severely in the Canadian cases. In the 40 to 45 age group in the English series, 80 per cent. of males and 92 per cent. of females are unaffected, but in the Canadian series only 26 per cent. of males and 45 per cent. of females showed no change. In the 56 to 60 age group in the Canadian series 76 per cent. of males and 52 per cent. of females showed changes of + or more, while in the English series only 29 per cent. of males and 11 per cent. of females showed the same degree of change. In both males and females, in all age groups, the incidence of changes recorded as ++ or +++ is always appreciably higher in the Canadian series. Many more "gross" changes were seen in the Canadian series and this was particularly noticeable in the older age groups. These results confirmed the first impression gained in routine study of radiographs in Canada, where osteophytosis of the lumbar spine was so common that it was rarely considered worthy of comment by the radiologist reporting on the film. Any differences referred to are greater than would be expected to occur merely by chance.

TABLE
PERCENTAGE DISTRIBUTION OF DEGREES OF OSTEOPHYTOSIS OF THE LUMBAR SPINE
(as judged by radiographs taken in Saskatchewan, Canada, and Bristol, England)

Age Group		40-45		46-50		51-55		56-60		61-65		66-70		71-75		Over 75		All
Place		Can.	Eng.	Can.	Eng.	Can.	Eng.	Can.	Eng.	Can.	Eng.	Can.	Eng.	Can.	Eng.	Can.	Eng.	
M A L E S	No. of Patients ..	46	46	42	42	54	54	66	66	94	94	85	85	80	80	47	47	514
	Degree of Osteophytosis (%)	0	26	80	12	67	15	57	2	29	0	16	0	9	0	4	0	4
		±	46	20	57	31	28	22	23	42	14	37	9	31	5	29	2	40
		+	20	0	31	2	43	17	53	21	48	33	38	48	26	41	13	26
		++	9	0	0	0	13	4	18	8	34	13	39	12	43	20	49	23
		+++	0	0	0	0	2	0	5	0	4	1	14	0	26	6	36	6
	χ ²	30.556		29.586		23.624		34.130		38.458		41.508		35.126		34.218		177.2
n ¹		2		2		3		3		3		3		3		3		4
p		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01
F E M A L E S	No. of Patients ..	83	83	73	73	65	65	54	54	62	62	51	51	37	37	22	22	447
	Degree of Osteophytosis (%)	0	45	92	27	80	22	57	4	56	7	47	6	31	3	19	0	9
		±	43	8	51	18	43	31	44	33	19	36	14	49	8	35	9	46
		+	11	0	21	3	31	9	41	9	61	11	51	18	60	32	36	18
		++	1	0	1	0	3	3	7	2	11	7	28	2	19	14	36	27
		+++	0	0	0	0	2	0	4	0	2	0	2	0	11	0	18	0
	χ ²	43.018		40.920		18.964		39.594		44.572		39.528		15.858		10.476		179.132
n ¹		2		2		2		2		3		3		2		2		4
p		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01

Males: Additive $\chi^2=267.206$ $n=22$ $p=\text{less than } 0.01$.

Females: Additive $\chi^2=252.930$ $n=18$ $p=\text{less than } 0.01$.

Reasons for Differences

These differences are rather difficult to explain, particularly since the cause of spinal osteophytosis is in doubt. Shore (1935) suggests that ossification results from the strain put on the short deep intervertebral ligaments when the nucleus pulposa loses its normal elasticity and tends to bulge. This bulging occurs laterally owing to the weaker ligaments in that area. Collins (1949, p. 311) adds histological evidence that the ordinary osteophyte arises from the bulging of a collapsing disk.

Ageing.—Loss of elasticity of the nucleus pulposa is a normal ageing process which accounts for the prevalence of the condition in the older age groups. Bulging of the intervertebral disk occurs after the age of 40 and thereafter is a progressive process.

Trauma.—Shore also suggests that trauma may be an aetiological factor and that the condition may be related to the lifting of heavy loads. The occurrence of osteophytosis in the concavity of a scoliosis is constant and in this series of films many of the most gross changes were seen in association with scoliosis, particularly in the Canadian group.

Infection.—Toxic or infective factors have been suggested as contributing to the aetiology of this condition, but there is no evidence to support this.

Occupation.—There is no evidence that by habit or occupation the people of Saskatchewan are more exposed to traumatic influences than the people of Bristol. Although Saskatchewan is predominantly a wheat-farming province, the films studied were mostly from city dwellers.

Climate.—Climatic conditions, however, differ markedly from those prevailing in England, and it is possible that the extremely cold, dry winter, when the temperature drops to 40° F. below zero, the hot, dry summer when the temperature rises to 90°–100° F., and the dry centrally-heated homes, all help to cause the nucleus pulposa to lose its elasticity at an earlier age.

Drinking Water.—It is not possible to state with certainty that the figures given below represent the composition of the water used by all the patients in the two areas whose films were examined, but they are representative for the majority. Significant differences were found in the amounts of calcium carbonate (358 parts per million in Saskatchewan and 148 in Bristol), magnesium sulphate (277 parts per million in Saskatchewan and 5.4 in Bristol), and sodium sulphate (139 parts per million in Saskatchewan and nil in Bristol). It may be that

the higher amounts of these substances in the Saskatchewan water supply make the osteophytosis more obvious.

Summary

(1) A comparison is made in the incidence of osteophytosis of the lumbar spine in a series of radiographs taken in Saskatchewan, Canada, and Bristol, England.

(2) The conclusion is reached that the condition appears more frequently and reaches a more gross degree in Saskatchewan.

(3) Suggestions are offered regarding the possible causes of the differences found.

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**Ostéophytose de la colonne lombaire
 Comparaison de sa fréquence à Saskatchewan, Canada
 et à Bristol, Angleterre**

RÉSUMÉ

(1) On compare la fréquence de l'ostéophytose de la colonne vertébrale lombaire à Saskatchewan, Canada, et à Bristol, Angleterre, d'après les radiographies effectuées dans ces deux villes.

(2) On arrive à la conclusion que cette affection semble plus fréquente et plus prononcée à Saskatchewan.

(3) On suggère des raisons pouvant expliquer les différences constatées.

**Osteofitosis de la espina lumbar
 Comparación de su frecuencia en Saskatchewan, Canadá,
 y en Bristol, Inglaterra**

SUMARIO

(1) Se compara la frecuencia de la osteofitosis de la espina lumbar en Saskatchewan, Canadá, y en Bristol, Inglaterra, según radiografías hechas en ambas ciudades.

(2) Se concluye que esta afección parece ser más frecuente y más pronunciada en Saskatchewan.

(3) Ofrecense sugerencias respecto a las causas posibles de la diferencias encontradas.