FROM THE "KRONPRINSESSAN VICTORIAS KUSTSANATORIUM"
VEJBYSTRAND, SWEDEN (CHIEF: DR. JOHN BROLIN)

SOME VIEWS ON SKELETAL TUBERCULOSIS

(A Statistical Report)

By

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Although the question of skeletal tuberculosis has been very deeply studied from every point of view and many classical works have been published on it (Sv. Johansson 1924, E. Sorrel and Mme Sorrel-Dejerine 1932, G. Girdlestone 1940, Sanchis-Olmos 1948 and many others) the possession of a rather large series of cases leads the authors to publish the following pages. The statistical treatment of the material and the report of some points which in the authors' opinion have a special interest form the principal intention, while the discussion of any other point of the aetiology, the pathogenesis, the pathology, the clinical picture, the treatment and the prognosis of the disease is beyond the scope of the present work.

THE MATERIAL

The present work is exclusively based on patients who have been admitted and treated in the "Kronprinsessan Victorias Kustsanatorium", Vejbystrand, Sweden, during the last fifteen years (1936 up to 1950).

The case records of 3.498 patients (1.863 males and 1.635 females) were examined and studied.

Throughout this period the diagnosis apart from the clinical semiology and the history was also based on a) X-ray films and cutireactions in all the cases and b) laboratory examinations, for instance guinea-pig test, following up of the sedimentation rate (S.R.) and pathologo-anatomical diagnosis (PAD) in many of the cases.

The analysis of the material is given in the following pages.

In Table I the year and sex distribution of the material are shown.

TABLE I

Years	Skeletal tbc. cases			Other tbc. localisations			Not tbc. cases			Total
	♂	♀	Total	♂	♀	Total	♂	♀	Total	
1936[1]	218	168	386	85	79	164	28	31	59	609
1937[1]	85	69	154	72	74	146	28	24	52	352
1938	77	52	129	57	54	111	21	10	31	271
1939	60	51	111	33	56	89	14	11	25	225
1940	66	42	108	43	47	90	18	10	28	226
1941	77	53	130	37	48	85	17	16	33	248
1942	53	55	108	47	38	85	13	14	27	220
1943	79	40	119	34	27	61	23	15	38	218
1944	85	54	139	20	29	49	15	7	22	210
1945	47	46	93	13	11	24	6	4	10	127
1946	47	47	94	10	15	25	16	15	31	150
1947	49	42	91	13	20	33	11	17	28	152
1948	38	34	72	13	29	42	12	5	17	131
1949	39	32	71	30	25	55	11	9	20	146
1950	50	40	90	15	29	44	38	41	79	213
Total	1070	825	1895	522	581	1103	271	229	500	3498

[1] The high number of admissions in 1936 and 1937 is due to a rearrangement of the recording system of the hospital. All the cases under treatment during these two years were registered regardless of their year of admission.

From the 3.498 patients admitted and treated in the above mentioned Coastal Sanatorium during this 15-year period, 500 were cases a) with disease other than tuberculosis, admitted in the K. V. K. mainly because a tuberculous lesion was suspected at the time of the admission, b) with uncertain diagnosis which were completely excluded from the present series and c) convalescent cases of anterior poliomyelitis, because since 1950 a special department for such cases works in the above-mentioned hospital.

On the other hand from the remaining 2.998 tuberculous cases 1.103–522 males and 581 females–had localisations on other than the skeleton organs, for example in the lymphoglands, the urogenital system, the skin etc. Thus only 1.895 patients had skeletal localisations of the disease–1070 males and 825 females–that is, 54.17 per cent of the total number of admissions. Many among these patients had more than one localisation on the skeleton and/or in other organs.

157 deaths occurred among the whole material during this 15-year period. 125 occurred in patients with skeletal tuberculosis and 32 in all the other groups of patients. The mortality among the patients with skeletal tuberculosis is shown in more detail in table II.

TABLE II

	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	Total
♂	14	8	10	1	6	5	3	9	3	5	6	1	4	1	–	76
♀	11	4	3	2	3	3	3	–	5	3	3	3	4	1	1	49
Total	25	12	13	3	9	8	6	9	8	8	9	4	8	2	1	125

The mortality rate among the total number of cases of the present series was found to be as high as 4.49 per cent and 6.60 per cent among the skeletal tuberculous cases. The most frequent cause of death among the skeletal tuberculous cases was degenerative changes of the organs–amyloidosis–and complications of the disease itself like tbc. meningitis and miliar tuberculosis. It must be pointed out also that since the introduction of the antibiotics in the treatment of the disease the mortality rate has considerably decreased.

The year distribution of the material in the different age-groups according to the sex of the patients is given in table III.

Taking the age of fifteen years as the dividing line between the children and the adults we see that 465 cases–249 boys and 216 girls–belonged to the child-group while 1430 cases–826 males and 609 females–belonged to the adult-group. That means that only 24.53 per cent of the skeletal tuberculous cases belonged to children. We shall mention this point later on.

THE SKELETAL LOCALISATION

Among the 1,895 patients with skeletal tuberculosis 2.376 localisations were observed, an average of about 1.25 to each patient. Approximately the same proportion between the number of patients and that of the localisations is given by other authors. For instance E. Sorrel, Bufnoir and Fumet (1931) found 1.14 localisations for each patient in their series and Sanchis-Olmos (1948) 1.17.

The frequency of the different localisations in the different age-groups, is demonstrated in table IV. The sex distribution is also indicated.

The arthritis and the osteoarthritis made up in the present material 89.57 per cent of the total number of the localisations while the percentage over–11.43–consisted of cases with tuberculous osteitis.

Conditions affecting exclusively the bone tissue are usually described as osteitis. However, it occurs very often that an osteitis in its progression affects the neighbouring joint and that the picture of

TABLE III

	Sex	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	Total ♂	Total ♀
0-5	♂	21	5	7	4	3	4	3	10	6	1	1	5	2	4	2	78	
	♀	15	5	5	1	1	11	5	2	4	3	3	4	—	—	4		63
6-10	♂	24	7	5	3	5	7	6	12	9	3	3	—	1	1	5	91	
	♀	24	7	3	5	6	4	4	8	6	4	1	3	1	2	2		80
11-15	♂	23	6	11	4	4	4	2	5	6	2	2	4	2	3	2	80	
	♀	19	9	4	6	5	4	4	4	4	2	1	3	2	5	1		73
16-20	♂	31	14	9	9	5	11	5	10	14	4	5	10	4	5	2	138	
	♀	20	14	8	9	8	4	1	4	2	7	5	2	2	1	4		91
21-25	♂	32	18	10	8	8	19	17	12	15	7	10	5	4	3	5	173	
	♀	33	11	8	6	4	4	8	5	12	6	11	4	3	4	5		124
26-30	♂	38	12	12	10	7	10	4	10	8	7	4	8	3	5	3	143	
	♀	20	6	7	5	5	11	10	4	3	6	3	9	5	4	3		101
31-35	♂	14	7	8	9	6	7	4	5	8	7	4	5	6	3	4	97	
	♀	9	8	3	7	5	2	5	3	5	6	3	1	5	2	1		65
36-40	♂	11	4	3	2	9	3	2	4	8	3	7	5	3	3	5	72	
	♀	13	2	4	6	1	4	3	4	1	1	5	2	2	4	4		56

41-45	♂	6	4	3	4	3	3	4	2	1	5	3	3	4	2	9	56		
	♀	6	1	2	1	1	4	—	1	4	3	4	6	1	3	2		39	
46-50	♂	4	1	3	2	4	3	4	3	3	2	3	1	1	2	3	39		
	♀	2	1	2	3	1	2	1	1	6	2	2	2	2	1	3		31	
51-55	♂	5	3	3	4	4	3	1	2	—	1	4	1	4	3	2	40		
	♀	2	4	2	—	1	2	8	2	3	1	2	1	4	1	2		35	
56-60	♂	6	3	1	—	1	2	1	3	5	2	1	—	1	—	3	29		
	♀	5	—	3	2	—	—	3	1	3	2	4	3	3	—	4		33	
61-65	♂	2	—	1	—	3	1	—	1	1	3	—	2	1	3	1	19		
	♀	—	—	—	—	2	1	2	1	—	1	2	2	2	3	2		18	
66-70	♂	1	1	—	1	3	—	—	—	1	—	—	—	1	1	1	10		
	♀	—	1	1	—	1	—	—	—	1	1	1	—	2	1	1		10	
71-75	♂	—	—	—	—	1	—	—	—	—	—	—	—	—	1	—	2		
	♀	—	—	—	—	1	—	1	—	—	1	—	—	—	—	1		4	
76-80	♂	—	—	1	—	—	—	—	—	—	—	—	—	1	—	—	2		
	♀	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—		1	
81-85	♀	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1		
	♂	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1		1	
Total		386	154	129	111	108	130	108	119	139	93	94	91	72	71	90	1070	825	
																	1895		

TABLE IV

The Age and the Sex Distribution

Age	Sex	Spondylitis							Large joints							Spina		
		Cervical	Cervico-dorsal	Dorsal	Dorso-lumbar	Lumbar	Lumbo-sacral	Sacral	Sacroiliac	Hip	Knee	Ankle	Wrist	Elbow	Shoulder	Fingers and Metacarpals	Toes and Metatarsals	Humerus
0-5	♂	2	1	14	2	8	3	—	1	14	16	4	2	2	1	8	3	—
	♀	1	—	10	5	7	1	—	1	12	14	6	2	1	—	6	5	—
6-10	♂	—	3	13	7	9	2	2	—	30	9	8	1	1	3	3	—	—
	♀	1	1	8	6	7	3	1	—	33	12	7	3	5	1	1	2	1
11-15	♂	3	—	19	1	2	—	—	3	28	9	8	3	5	1	1	2	—
	♀	1	—	10	7	10	4	—	11	20	9	4	5	—	2	3	1	—
16-20	♂	4	1	28	4	32	2	—	7	21	16	22	8	3	7	6	2	2
	♀	1	—	21	2	21	2	—	13	11	10	14	2	3	2	4	—	—
21-25	♂	3	2	30	12	41	7	1	14	27	24	18	5	17	3	2	—	1
	♀	2	—	18	10	43	7	1	15	18	11	5	1	11	4	3	1	—
26-30	♂	2	—	34	10	39	2	1	13	22	19	9	8	4	6	4	—	—
	♀	2	1	18	10	36	2	1	9	10	11	6	2	3	4	—	—	—
31-35	♂	—	—	19	5	24	2	—	3	13	14	7	4	2	7	1	4	1
	♀	—	1	12	9	22	3	—	4	6	4	5	1	5	1	—	—	—
36-40	♂	3	—	11	6	17	1	—	4	10	15	7	3	2	2	1	—	—
	♀	—	—	8	9	21	—	2	3	17	5	4	3	4	5	1	—	—
41-45	♂	1	—	14	4	14	—	—	2	14	2	2	5	1	1	—	—	—
	♀	1	—	7	2	12	1	—	3	9	5	5	1	—	—	—	—	—
46-50	♂	1	—	5	2	10	1	—	2	8	8	1	1	3	2	—	—	—
	♀	1	—	10	1	5	2	—	—	4	5	3	—	2	2	1	—	—
51-55	♂	2	—	7	2	8	3	—	—	10	5	5	—	1	4	1	1	—
	♀	—	—	4	—	14	1	1	2	7	2	2	2	1	—	1	—	—
56-60	♂	1	—	1	3	9	—	1	—	5	5	2	1	2	2	—	—	—
	♀	1	—	9	3	10	—	1	1	2	3	2	1	2	1	—	—	—
61-65	♂	1	—	3	1	3	—	—	—	3	2	2	3	2	2	—	—	—
	♀	—	—	7	—	5	1	—	—	—	1	2	—	1	—	—	—	—
66-70	♂	1	—	2	—	—	—	—	1	1	—	2	1	2	3	—	—	—
	♀	—	—	3	—	3	—	—	—	2	1	2	—	1	2	1	1	—
71-75	♂	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	♀	—	—	—	1	—	—	—	—	1	—	—	1	—	—	—	—	—
76-80	♂	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	♀	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—
81-85	♂	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
	♀	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Total	♂	24	7	202	59	216	23	5	50	206	144	97	45	47	45	27	12	4
	♀	11	3	146	65	217	27	7	62	152	94	67	24	39	24	21	10	1
Total		35	10	348	124	433	50	12	112	358	238	164	69	86	69	48	22	5

[1] 43 localisations on the trochanter major are also included in this group.

TABLE IV

of the Localisations.

Ventosa					Different localisations									Rare localisations	Total		Total
Radius	Ulna	Tibia	Fibula	Ribs	Sternum	Pubic + Symphysis	Zygomatic	Sterno-Clavicular	Iliac	Metacarpo-Metatarso-Phalangeal J	Mandible	Ischiac	Skull		♂	♀	
—	2	1	2	—	—	—	2	—	1	1	—	—	—	1	91		
—	—	—	—	—	—	—	2	—	—	—	—	—	—	—		73	164
1	—	—	—	2	1	—	1	—	1	2	—	1	1	1	102		
—	—	1	—	2	—	1	—	—	—	—	1	—	—	—		97	199
—	—	2	—	—	—	1	—	—	—	—	—	1	1	—	90		
1	1	—	1	2	—	—	—	—	—	—	—	1	—	1		94	184
2	1	—	—	6	—	1	1	—	1	1	—	3	—	—	181		
—	—	—	—	3	—	2	—	—	—	1	—	—	—	—		112	293
1	2	3	—	10	1	1	—	—	1	—	—	—	—	1	227		
—	1	1	—	3	—	1	—	—	—	1	—	—	—	—		157	384
—	—	—	—	15	1	1	—	1	—	—	—	—	—	1	192		
1	—	—	—	3	1	1	—	1	—	—	—	1	—	—		123	315
—	—	—	—	5	2	1	—	—	—	—	—	1	—	—	115		
—	—	—	—	3	—	—	1	—	1	—	—	—	—	1		79	194
—	—	—	—	4	—	1	1	—	—	—	—	—	—	—	88		
1	—	—	1	2	2	—	—	—	1	1	—	—	—	—		90	178
—	—	—	—	3	2	—	1	—	—	—	1	2	—	—	69		
1	—	1	—	2	—	—	—	—	1	—	—	—	—	—		51	120
—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	45		
—	—	—	—	2	1	1	—	1	—	—	—	—	—	1		42	87
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	49		
1	1	—	—	2	—	—	—	—	1	—	—	—	—	—		42	91
—	—	—	—	3	—	—	—	—	—	—	—	—	1	—	36		
—	—	—	1	4	—	—	—	—	—	—	—	—	—	—		41	77
—	1	—	—	2	1	—	—	1	—	—	—	—	—	—	27		
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		17	44
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13		
1	—	1	—	—	2	—	—	1	—	—	—	—	—	—		21	34
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2		
—	—	1	—	—	—	—	—	—	—	—	—	—	—	—		4	6
—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1		
—	—	—	—	1	—	—	—	—	—	—	—	—	—	—		3	4
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1		
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		1	2
4	6	6	2	51	8	6	6	2	4	5	1	8	3	4	1329		1329
6	3	5	3	29	6	6	3	3	4	3	1	2	—	3		1047	1047
10	9	11	5	80	14	12	9	5	8	8	2	10	3	7			2376

an osteoarthritis arises in this way secondarily. It becomes obvious then that the distinct separation of these two pathologoanatomical conditions is sometimes very difficult.

In the present work the classification was made in general as follows: the pathologoanatomical picture known as "spina ventosa" and the affection of the diaphysis of the long bones and that of the wide bones are considered as osteitis, while all the other localisations are considered as osteoarthritis. Even the osteitis of the trochanter major is classified as osteoarthritis of the hip joint, just as the osteitis of the short bones of the carpus is regarded as osteoarthritis of the wrist and that of the bones of the tarsus as osteoarthritis of the ankle joint.

The proportion between arthritis and ostheoarthritis on the one hand and the osteitis on the other was found as follows by other authors: Sv. Johansson (1924) found 31.69 per cent osteitis among 407 cases of skeletal tuberculosis in children, Sorrel et al. found 13.92 per cent osteitis among 4.660 cases of skeletal tuberculosis in children, Th. Garophalides (1945), 9.73 per cent among 730 patients and J. Brolin[1], 9.89 per cent among 3.163 cases.

A certain variation on those percentages is reasonable because a number of osteitis, for instance, those of the phalanges and the ribs, are treated in General surgical clinics by radical operative measures.

The spondylitis as a whole formed 43.01 per cent of the present material and especially the lumbar localisations–433 cases–18.22 %, the dorsal–345 cases–14.52 %, the dorso-lumbar–124 cases–5.21 %, while the remainder 5.06 % was distributed among the other localisations on the vertebral column. The respective data from other series collected from the literature were: Frosch (1921) observed 43.12 % spondylitis among 1.159 localisations, Whitman (1917) 42.5 % among 13.308 localisations, Valtancoli (1922) 45,5 % among 2.790 localisations, Brolin 28.67 % among 3,163 localisations and Sanchis-Olmos 40.83 % among 480 localisations in childhood. Johansson found 22.36 % spondylitis among 407 cases and in particular 5.64 % lumbar localisations, 9.33 % dorsal and 4.17 % dorso-lumbar localisations. Sorrel et alias observed among 7.529 skeletal affections, 5.8 % lumbar, 6.42 % dorsal and 3.2 % dorso-lumbar localisations, Garophalides in his own series observed 40.82 % spondylitis in 730 patients among which 21.91 % were lumbar and 17.53 % dorsal localisations. Sanchis-Olmos found among 124 spondylitis 14.37 % dorsal, 5.41 % lumbar

[1] J. Brolin: Unpublished statistical work based on 3,163 localisations of tuberculosis on the skeleton, from the same hospital–K.V.K.–during a 20-year period (1920 up to 1929).

and 2.79 % dorso-lumbar localisations. G. Girdlestone (1940) finally observed 287 spondylitis–he does not say among how many cases–with 88 lumbar localisations, 97 dorsal and 65 dorso-lumbar.

The percentage of the localisations on the vertebral column in the present series is approximatively the same as in the majority of the other mentioned statistics but considerably differs from those given by Johansson and Sorrel et alias. On the other hand the lumbar localisations in the present material possessed first place among the localisations on the vertebral column while the dorsal spine was the more commonly affected in most of the above-mentioned series.

Among *the localisations on the large joints* those of the hip possessed the most prominent place in the present series–358 cases–with 15.06 % of the total number of localisations. As it has been pointed out above, the group of the tuberculosis of the hip joint also includes the osteitis of the trochanter major. 43 cases of trochanteritis were observed in the present series. 26 were right-sided and 17 left-sided. 5 belonged to the child-group and the remainder to the adult-group. 20 females and 23 males were affected.

The localisations on the knee joint possessed second place among those of the large joints–238 cases or 10.02 per cent of the localisations. The ankle joint took third place–164 cases or 6.90 %–and the percentage over was distributed between the other large joints of the limbs, that is, the elbow, the wrist and the shoulder joint. The following percentages are given by other authors:

	Coxitis	Gonitis	Tbc. of the ankle joint
Frosch	23.2 %	17.2 %	8.2 %
Whitman	30.5 %	—	—
Valtancoli	26.9 %	14.4 %	5.2 %
Brolin	26.11 %	13.5 %	9.4 %[1]
Johansson	17.94 %	14.74 %	6.39 %
Sorrel et al.	13.05 %	8.67 %	2.8 %[1]
Malluche	13.90 %	12.9 %	8.3 %
Garophalides	22.6 %	22.2 %	4.52 %
R. C. Murray	—	11.0 %	—
Sanchis-Olmos	28.91 %	9.58 %	5.83 %

[1] Including both osteitis of the tarsus and arthritis of the ankle joint.

Excluding the principal large joints of the limbs the following data are given for the three other joints:

The frequency of the affection of the elbow joint was according to Johansson 4.18 %–17 cases among 407–according to Sorrel et al.

3.13 %–236 among 7.529 localisations-according to Sanchis-Olmos 1.45 %–7 among 480 cases–and according to Brolin 3.35 %–106 among 3.163 cases. The elbow joint was found affected in the present series in 86 cases among 2.376 localisations–3.62 per cent.

The shoulder joint was found affected in 4 cases–0.97 per cent–by Johansson, in 70 cases–0.93 %–by Sorrel et al., in 46 cases by Magnusson (1935)–he does not say among how many–in 43 cases among 3.163 by Brolin–1.36 %–in 27 cases among 2.922 by S. M. Thompson–0.92 %–and in 11 cases among 480–2.37 %–by Sanchis-Olmos. In the present series the incidence was found as high as 2.9 %–69 cases among 2.376 localisations.

The wrist was found affected in 10 cases according to Johansson–2.45 %–, in 114 cases–1.51 %–according to Sorrel et al., in 112 cases –3.5 %–by Brolin, in 5 cases–1.04 %–by Sanchis-Olmos and in 69 cases –2.9 %–in the present series.

Among the osteitis of the type of spina ventosa those of the ribs possessed first place in the present material. 80 such cases were observed, that is, 3.37 % of the total number of localisations. Nearly the same proportion is mentioned by Johansson (4.91 %), by Sorrel et al. (1.23 %), by Brolin (0.75 %) and by Sanchis-Olmos (0.2 %). Those occurring in the short bones of the hand and foot (metacarpals, metatarsals and phalanges) were observed in 70 cases (2.94 %). 40 cases of osteitis of the diaphysis of the long bones were observed (1.68 %) and also 1 case of osteitis of the clavicle. The osteitis of the plate bones on the other hand were less common. The sternum was found affected in 14 cases and some other localisations were also observed. In Table IV more details on this point are given.

The localisations on the *pelvic girdle* were found in the present work to be much more frequent than in other statistics. The *sacroiliac joint* was the most often affected part of this skeletal region, that is 112 cases (4.71 % of the total number of localisations). Garophalides gives a percentage of 3.56 % and Seddon observed 140 cases (he does not say among how many) while Sisefsky (1933) gave a very detailed report of 107 cases, treated in the Coastal Sanatorium of Apelviken in the period (1920–1932). 66 among the 107 were certain cases of tuberculous sacroilitis according to the author. Allaria (1951) described also clinical and statistical observations from 143 cases of tuberculous sacroilitis, and Casuccio and Longhi (1951) from another 164 cases. The figures given by other authors are even lower. Thus Valtancoli observed 31 cases among 2.790 (1.11 %), Johansson observed 1 case among 407 of his material in childhood, Sanchis-Olmos 4 cases among 480 (0.83 %) and Sorrel et al. only 2 cases among 7.529

localisations. The great difference between different statistics as to the tuberculosis of the sacroiliac joints is a striking point. Sorrel and Mme Sorrel-Dejerine point out that many cases diagnosed as sacroilitis were found to have had previously an affection of the sacrum or the lower lumbar vertebrae. From these foci the infection had spread and infected the sacroiliac joints secondarily. Only in their 2 cases was the isolated affection of the sacroiliac joint verified. Anyhow in the present series all the involvements of the sacroiliac joints were taken into consideration regardless of their primary or secondary affection. Another point worthy of notice here is the mortality observed among the patients with a tuberculous sacroilitis. Thus among 112 cases of affection of the sacroiliac joints 9 deaths occurred (8.03 %).

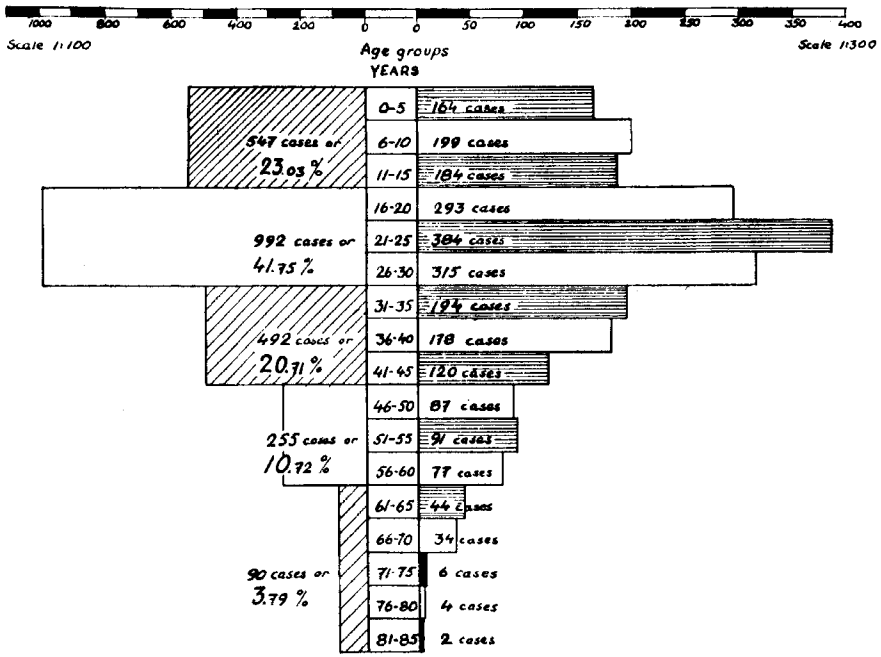
The pubic bones (including the symphysis) were found affected in 12 cases, the iliac bones in 8 cases and the tuberosity of the ischiac bones in 10 cases in the present series, the respective percentages being 0.51 %, 0.34 % and 0.42 % of the total number of localisations. Sorrel et al. observed 20 localisations on the pubic bones (0.26 %) and 14 in the ischion (0.18 %). Valtancoli observed 5 cases, N. Silfverskiöld (1933) 2 cases, Stagno (1951) 3 cases (1–2 ‰) and Hellstadius (1934) 11 localisations (0.34 %) on the pubic bones.

As to the localisations on the diaphyses of the long bones, although they are considered as rather rare, these were found in 40 cases in the present material (1.68 %). Magnusson (1935) in a monograph on this subject gives a percentage of 1.08 % (30 among 2763 cases) and he refers to many other statistical works in which the percentage is lower or higher. Sanchis-Olmos gives a percentage of 1.25 % (6 among 480 cases).

Finally it may be of interest to mention that among the localisations on the cranial and the facial bones those of the zygomatics were the most often observed in the present series (9 cases or 0.38 %). Except Brolin who observed 14 cases (0.43 %) in none of the other above mentioned works was such a localisation reported.

As to the distribution of the localisations according to the age of the patient in the present work it is shown in the following graphic.

On this point the data taken from the present work completely differ from those given by other authors. Watson-Cheyne found in his series 54 % belonging to individuals under the age of fifteen, Alfer 47 %, Whitman 78 %, Käfer 50 % and Sorrel et al. 70.8 %. This fact in Thrap-Meyer's opinion (1950) is explained by the shift, that has been observed in this century, of the age for tuberculous infection from childhood into adolescence and adulthood. Perhaps also the selection of the patients among the younger generation in many of the



Coastal Sanatoria is an important factor, explaining this difference. G. Frising since 1935 pointed out the diminished incidence of skeletal tuberculosis in children in this country, and H. Waldenström, P. Haglund and G. Odelberg-Johnson agreed with him in a discussion held in the Nort. Ort. Assoc. 1934.

As is mentioned earlier 2.376 localisations were observed on 1.895 patients forming the present material. The difference is due to the multilocalisation which was very often observed in the series. Although no difference was observed among the present series and other works as to this point the authors in a comparison of the percentages of the different 15-year periods among the number of patients and that of the localisations of the present series were able to ascertain that the multilocalisation was a common phenomenon in all the ages. The comparison was made as follows:

	% of the No. of patients	% of the localisations
0-15	24.54	23.02
16-30	40.63	41.75
31-45	20.32	20.71
46-60	10.92	10.73
61-80	3.59	3.70

The distribution of the localisations as to the sex of the patient was found as follows in the present work: Out of a total of 1.895 patients with skeletal tuberculosis 825 were females, that is 43.54 %. The same incidence was observed among 2.376 localisations, 1.047 or 44.07 % belonged to females. In the different 15-year age-groups also this proportion, with the addition of about ± 6 was found standard as follows:

0–15	46.61 %
16–30	38.18 %
31–45	46.93 %
46–60	49.00 %
and 61–80	50.00 %

As to the sex the different authors agree that males are a little more often affected by skeletal tuberculosis than females (Frosch, Krause, Alfer, Whitman, Tubby, Johansson, Brorlin and others).

RARE LOCALISATIONS

Some very rare localisations (7 cases) were observed among the present series.

The *clavicle* was found affected in one case. Some cases have been described previously on the same subject. Thus Sorrel and Mme Sorrel-Dejerine observed 7 cases among children and 7 cases in adults. The authors point out that although syphilis shows a relatively frequent localisation on these bones tuberculosis on the contrary shows some respect to them. On the other hand Johansson observed another case that he found among his material. He points out the rareness of localisation on the clavicle and he mentions that Valtancoli does not find such a localisation among his material although he described 86 cases of tuberculosis of the upper extremities. Brolin also found 4 cases of tuberculosis of the clavicle among his 3.163 localisations.

In another case of the present material the *acromioclavicular joint* was found affected. The localisation on this joint seems to be a very rare one, as Corsi (1949) pointed out in a recent publication. The author observed such a localisation five times among his material consisting of about 4.545 cases of skeletal tuberculosis (0.11 %). A description of the case is given below.

No. 83/44. Female. Born 20/12 1896. In-patient in K.V.K. 3/5 1944–2/3 1946 and 15/2 1947–22/2 1947.

The first time she was treated under the diagnosis: Spondylitis tbc. thoracal. + Tbc. peritonei (?) + Empyema pleurae dx. She was operated on for her spon-

dylitis the 10/8 1945. (Osteosynthesis of the spine. Albee's technique). Discharged from the hospital in a very good general condition. Admitted again on February 1947 in a very bad general condition and died within a week. This time the diagnosis was as follows: Spondylitis tbc. thorac. + Arthritis tbc. sternoclavicular. sin. et *acromioclavicularis dx.* + Tbc. pulm. dx. cum. empyema pleurae dx. + Tbc. intestinal + Amyloidosis organorum.

On her admission the patient complained, among her different other troubles, about pain even from the right acromioclavicular joint. Clinically a fluctuating plum-sized prominence was present over the joint. Because of the patient's very bad condition and the very short time until death no further investigation was done.

Obduction: Over the left acromioclavicular joint a plum-sized resistance, the incision of which showed it to contain yellow-green pus. The abscess communicates with the underlying joint. The other diagnosis is also justified from the obductional findings.

Discussion: The case is a typical one of a multiplied tuberculosis of the skeleton. Among the localisations an acromioclavicular arthritis was also observed. Although no specific examination verified the diagnosis the multilocalisation in the one hand and the obductional findings in the other justify the diagnosis in the authors' opinion.

The bones forming the *orbital cavity* were affected in one of the present cases. Although this localisation is rare among the cases of the present material, some more cases are described in the literature. Johansson for instance observed 11 such localisations among 20 on the cranial bones.

The *diaphysis of the femur* was found affected in one of the present cases. But this localisation can not be considered as a rare one. In Magnusson's series, among the osteitis of the diaphysis of the long bones those of the femur's possessed first place (9 among 30 cases). In Brolin's series on the other hand the diaphysis of the femur was found affected in 13 cases.

A localisation on the *coccyx* was observed in one of the present cases. No similar case is published in the literature at least as far as the authors could find. The localisation on the coccyx must be considered as a very rare one. The case-record was as follows:

No. 130/50. Male. Born 22/10 1922. Treated in K.V.K. 11/7–26/8 1950. Diagnosis: Tbc. os. coccygis.

No known tbc. infection in the patient's family or environment.

1944: Pleurisy.

During recetn years, he developed pains in the region of the sacral bone.

1948: Diagnosis of tbc. os. coccygis in the Sahlgrenska Hospital in Gothenburg (Fig. 1). Exstirpation of the greater part of the coccyx was performed but a sinus appeared post-operatively for which the patient was treated in the Coastal Sanatorium of Apelviken. The sinus was healed but reappeared 13/6 1950 and then a

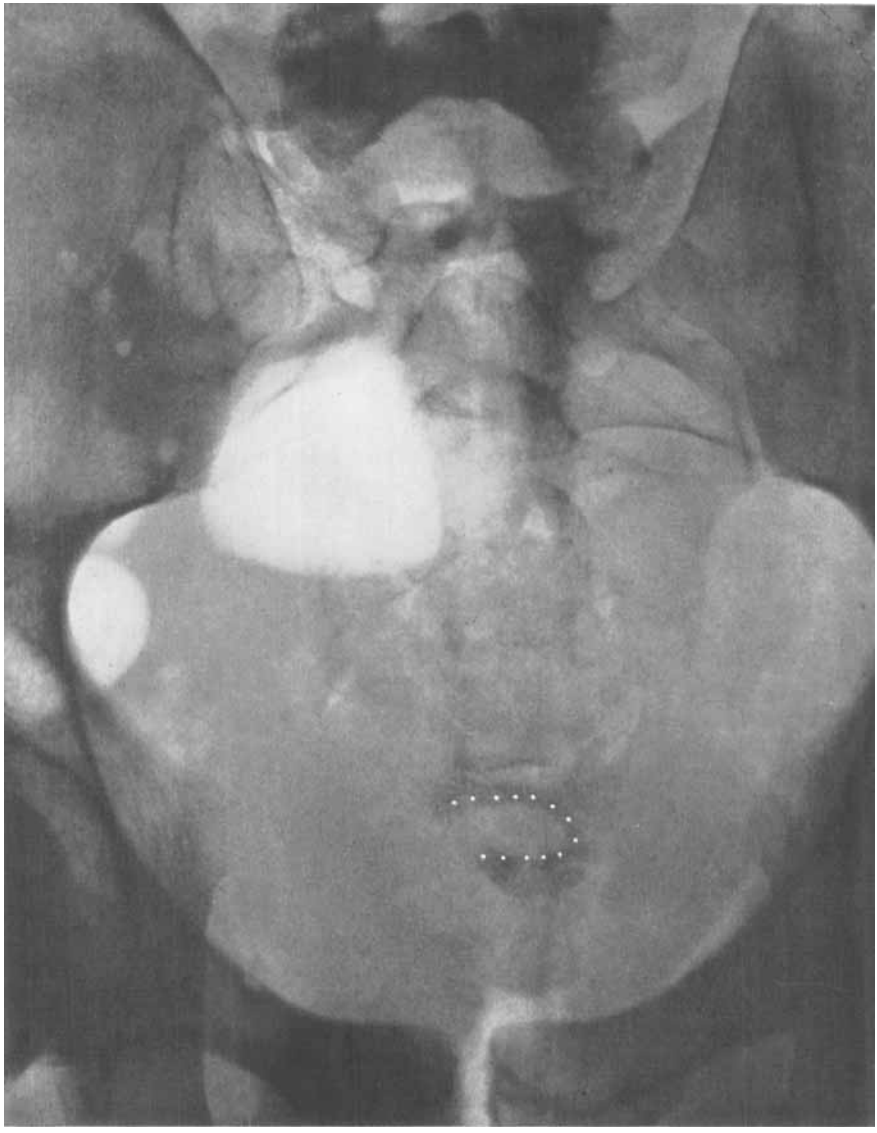


Fig. 1.
Case No. 130/50. Frontal view 7.4.1948. The first vertebra of the coccyx is destroyed for the greater part. A round defect open to the left side is visible with its upper limits blurred. The upper limits of the second vertebra are in some way irregular. No sequesters. The sacrum completely intact.

new operation (sequestrectomy) was performed in the Hospital of Mölndal. The P.A.D. was now positive for tbc. Although the operative trauma was healed the patient was admitted into K.V.K. for further observation.

Mantoux: Positive. S.R.: 8 mm.

The patient was discharged without any subjective symptom of his disease, the sinus having healed since the time of the second operation.

Discussion: The case is a sure one of a tuberculosis of the coccyx for the diagnosis was also verified with a positive P.A.D.

A localised *osteitis of the spinal process* of the second lumbar vertebrae was once observed in the present material.

No. 54/38. Male. Born 24/11 1934. Treated in K.V.K. 14/3–28/12 1938.

Diagnosis: Osteitis tbc. proc. spinos. L2 cum absces. No known exposition on tbc. infection.

Febr.–March 1937: Non-specific subperiostal abscess in the right part of the frontal bone. Incision. P.A.D. Negative for tbc. During recent months a swollen fluctuating prominence appeared in the region of the right sacroiliac joint, without any other previous subjective symptom. Aspiration of the abscess: 30–40 cc. pus. Guinea-pig test: Positive. Culture: Tuberculous bacteria of human type.

Pirquet: Positive. S.R.: 35 mm.

X-ray film 16/3 1938. *Side picture.* Nothing pathologic either from the lumbar vertebral bodies or the intervertebral spaces. In the lower part of the spinal process of the L2 a rather big defect shadow without clear limits, which ventrally seems to reach the arch. Below it a nearly calcified shadow. *Dorso-ventral picture.* In the lower part of the arch of L2 respectively to the spinal process, a rather well defined area. In the left eleventh rib a bean-sized rarefaction with blurred limits[1].

1/7 1938: Sequestrectomy + evacuation of the granulations.

Postoperative course regular.

Discharged from the hospital quite symptom-free.

Admitted again into the hospital 24/9 1940–21/1 1941 because of a lymphadenitis tbc. colli. He did not complain again of any trouble from the spine.

Discussion: Here too a sure diagnosis was made, confirmed by a guinea-pig test. The affection of the spinal processes of the vertebrae must be considered as a rather rare phenomenon. Sorrel and Mme Sorrel-Dejerine observed 3 cases among their material and they claimed that this kind of localication was very rare. The coexistence of such localisations with a real spondylitis (affection of the bodies) is seen under these authors a little more often than the isolated localisations on the spinal processes.

An osteitis of the *scapulae* was found once in the present material.

[1] X-ray films of this case were not found in the roentgen-archive of the hospital, so that reproduction was impossible.

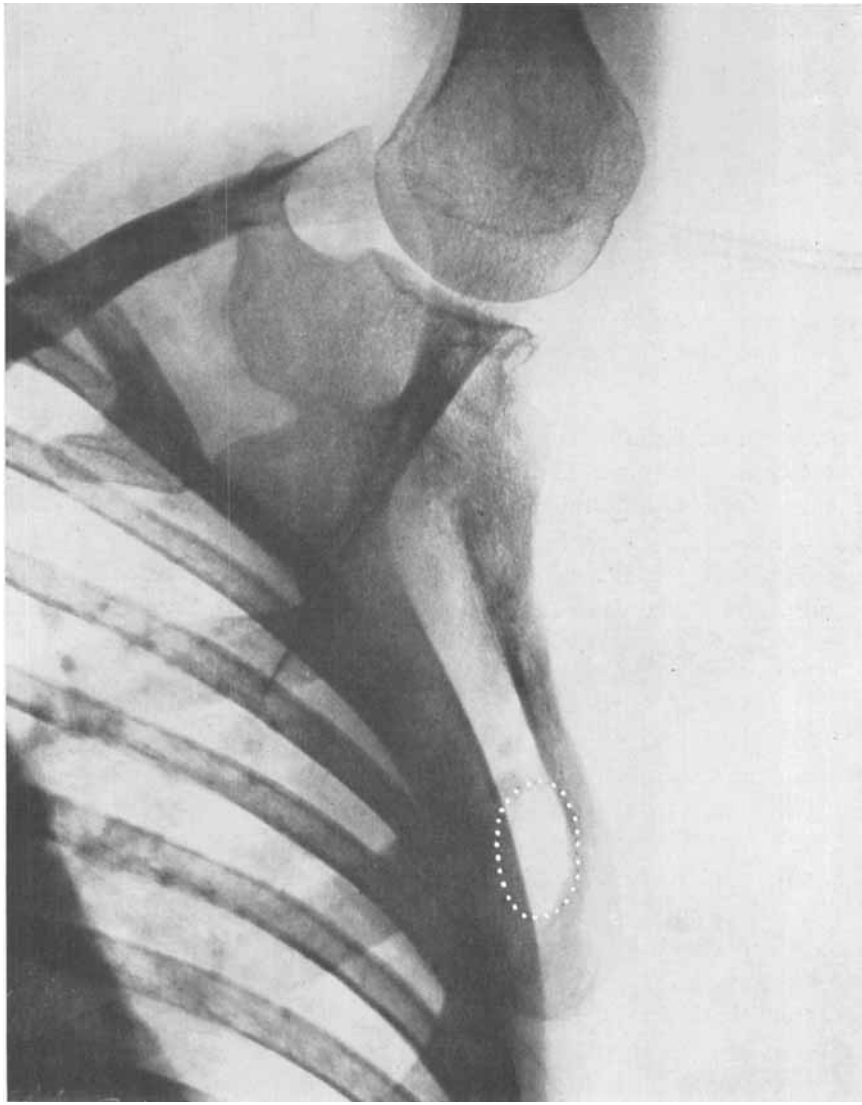


Fig. 2.

Case No. 313/37. Frontal view 14.10.1938. The arm being elevated a part of the scapula is visible. The lateral contours of the scapula are blurred and ragged from the border of the glenoidal cavity to the angulus. Rarefactions and stratifications. A perforating round hole of about 4 cm. diameter, with well defined limits is demonstrated in the region of the angulus.

No. 313/37. Female. Born 1923. Admitted into K.V.K. November 1937.

Diagnosis: Osteitis tbc. scapulae sin cum absces. + absc. tbc. reg. trochanter dxt.

Previously healthy. However, for a year, suppurations took place in the left axillary cavity, the shoulder region and the upper part of the arm.

Incision followed by sinus-formation.

Pirquet: Positive. W.R.: Negative.

Clinical examination at the time of admission: A sinus in the left axillary cavity which can be probed a few centimeters inwards penetrating the scapula. Inside the proximal third of the upper arm a sinus opening, but probably no sinus duct. Free abduction of the arm as far as the horizontal plane and even more but with the help of the scaqula (Fig. 2).

After a two-month conservative treatment (immobilisation with a plaster cast) the sinuses are healed.

Discharged from the hospital without any trouble.

Reexamination on March 1939. No sign of reanimation.

Discussion: Although no special laboratory examination was made to certify the diagnosis, the presence of a tuberculous lesion seems to be sure since syphilis was excluded and no acute symptoms were observed to justify a septic condition.

Colantuano (1949) reported also a case of tuberculosis of the scapula, and Ponzi (referred to by Sanchis-Olmos) two other cases.

CONCLUSIONS

2.376 localisations were found in 1.894 patients suffering from skeletal tuberculosis. The spondylitis as a whole and the lumbar spondylitis as a part possessed the most prominent place among the different localisations. Tuberculosis of the hip joint came second in frequency and the different other localisations followed.

The age-group between 16–30 years was found the most frequently affected among all the 15-year age-groups. The age-group 0–16 (children) took second place in frequency and the others followed, progressively diminishing with age.

As to sex, no important difference was found and the proportion was always about the same among the different age periods, the males being always a little more often affected than the females.

Some very rare localisations were also found among the cases of the material described in more detail.

RESUME

2.376 localisations ont été trouvées chez 1.895 malades affectés de tuberculose skelettique. Les spondylites en général, et les spondylites lombaires plus particulièrement, occupaient la place prépondérante

parmi ces différentes localisations. Les coxalgies occupaient la seconde place et les autres localisations suivaient par rapport à la fréquence.

La classe d'âge entre 16 et 30 ans était le plus fréquemment affecté parmi tous les groupes de 15 ans. Les autres suivaient en diminuant progressivement avec l'âge.

En ce qui concerne le sexe aucune différence importante n'a été observée parmi les différents groupes d'âge, et la proportion est toujours restée à peu près la même, les hommes étant un peu plus souvent atteints que les femmes.

Quelques localisations très rares, qui sont décrites en détail, ont aussi été constatées parmi les cas des présentes observations.

ZUSAMMENFASSUNG

Bei 1.894 Patienten die an Knochen und Gelenkstuberkulose litten wurden 2.376 Herde gefunden. Die Spondylitis im allgemeinen und die Lendenwirbeltuberkulose im besonderen nahmen den ersten Platz unter den verschieden Lokalisationen ein. Die Tuberkulose der Hüfte kam an zweiter Stelle in Bezug auf Häufigkeit und die verschiedenen anderen Lokalisationen folgten nach.

Die Altersgruppe zwischen 16–30 Jahren war am häufigsten von allen in der 15 Jahre-Beobachtungsperiode ergriffen. Die Altersgruppe 0–16 (Kinder) kam an zweiter Stelle in Bezug auf Häufigkeit und die anderen folgten mit einer fortschreitenden Abnahme der Häufigkeit des Leidens bei zunehmendem Alter.

Keine wesentliche Geschlechtsdifferenz konnte gefunden werden und das Verhältnis war ungefähr dasselbe durch die verschiedenen Altersabschnitte, indem die männlichen Patienten immer etwas häufiger erkrankt waren als die weiblichen.

Einige sehr seltene Lokalisationen, die in diesem Krankengut gefunden wurden, werden eingehender beschrieben.