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RADIOLOGICAL STUDIES OF THE WRIST JOINT AMONG CHAIN SAW OPERATING LUMBERJACKS IN JAPAN

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Radiological changes of the wrist joint among 580 chain saw operators and 90 forestry workers (control) who had never used vibratory tools have been studied. In both groups, degeneration in the distal radio-ulnar joint and the lunate bone was recorded as a prominent finding. However, changes peculiar to chain saw operators or a close relation between those changes found and the number of years spent operating a chain saw could not be found in this study.

Key words: radiological study; wrist joint; chain saw operator; variant of the ulna

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Throughout the world, recent technological developments have become the cause of various occupational disorders. In fact, even as early as 1911, there was a report by G. Loriga on the relationship between vibratory tools and "white finger" (Miura 1975).

Since 1955, use of the chain saw among Japanese lumberjacks has increased steadily and is now common throughout the country. Furthermore, by 1963, the average number of hours which Japanese forestry workers spent daily operating a chain saw had reached five (Miura 1975). In 1970, in an effort to prevent vibration syndrome, this time was limited to 2 hours by National Forestry officials.

Radiological changes of the wrist joint among 580 chain saw operators and 90 controls have been under study since 1970.

METHOD

For this study, X-ray films of the 670 chain saw operators and controls were examined, as shown in Table 1. Standard antero-posterior and lateral exposures of the wrist joint (Kagita 1966) were collected at this clinic and then studied by the authors of this paper.

In grading radiological changes, the following numerical expressions were used; 0 to mean normal, 1 corresponding to a slight change and 2 meaning a prominent change. The numerical designations of several items, such as bony atrophy, cyst formation, spur formation, narrowing of the joint space, anomaly or subchondral bony sclerosis, were summed up for each joint, the result being the grade of overall radiological degeneration.

RESULTS

The age distribution and years spent operating a chain saw were as shown in Table 1.

Variants of the ulna were detected in the antero-posterior view. If the longitudinal difference between the ulna and the radius in the distal radio-ulnar joint was less than 1 mm, the ulna was classified as a zero variant; if the difference was more than 1 mm, the longer ulna was ranked a plus

variant and the shorter ulna was designated as a minus variant. This definition was different from the usual one, as formulated by Hulten (1935).

Of the 670 cases studied, 55.2 percent showed the zero variant, 43.7 percent a plus variant and 1.1 percent a minus variant. No differences were found between the right and the left wrist joints, as shown in Table 2.

Among the various changes recorded, arthrosis-like changes of the distal radio-ulnar joint were the most remarkable, followed by a cyst formation of the carpal bone, as shown in Figures 1 and 2.

Among the carpal bones, subchondral bony sclerosis and cystic changes were recorded most frequently in the lunate, then in the triquetrum and thirdly in the navicula, as shown in Figures 2 and 3. These changes were particularly common in chain saw operators under the age of 49 with a plus variant.

However, radiological changes of the wrist joint did not increase in accordance with the number of years spent operating chain saws, as shown in Figure 4.

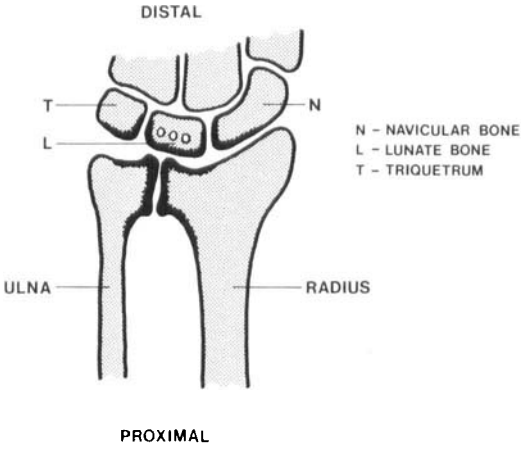

Figure 1. Illustration of radiological changes in A-P view of the wrist joint.

DISCUSSION

Nowadays, Japanese forestry workers are mainly in their forties, fifties and sixties. Thus, in this study, age-related changes had to be analyzed along with the other radiological changes.

Table 1. Age distribution and number of years spent operating chain saws

Years of chain saw operation / Age	20–39	40–49	50–	Total
0–5	7	10	5	22
6–7	17	20	5	42
8–9	19	29	9	57
10–	126	228	105	459
Total	169	287	124	580
Control	20	43	27	90

Table 2. Variant of the ulna (percent in 670 persons)

Left / Right	Plus	Zero	Minus	Total
Plus	34.4	7.7	0	42.1
Zero	10.7	45.2	0.9	56.8
Minus	0.2	0.6	0.3	1.1
Total	45.3	53.5	1.2	100.0

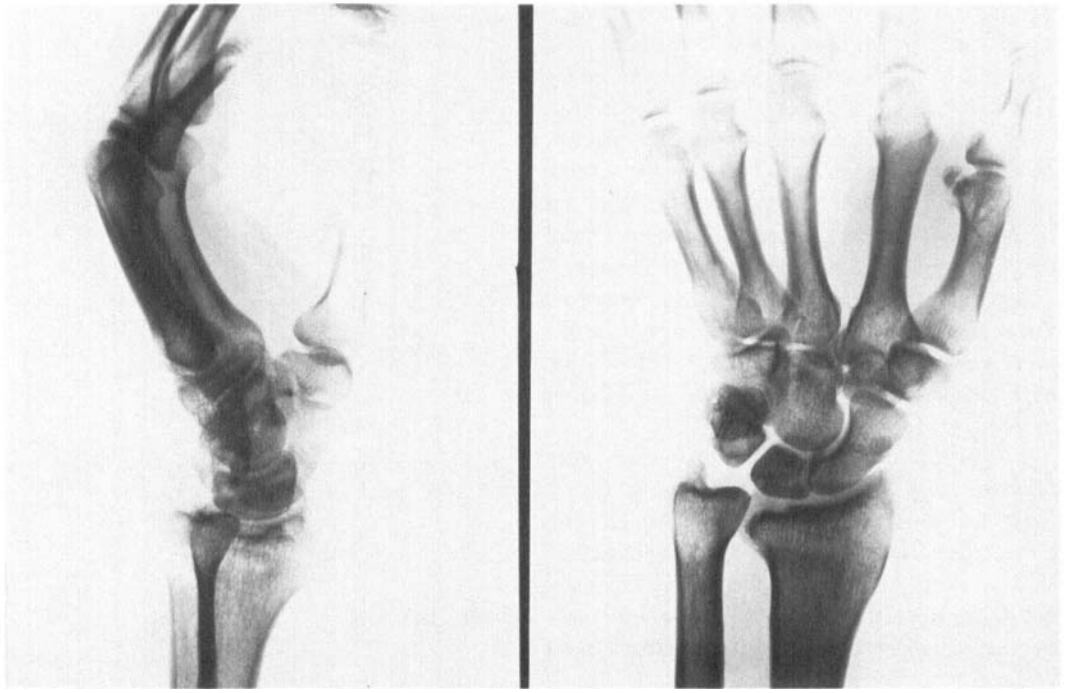

Figure 2. The wrist joint of a chain saw operator (plus variant of the ulna, cystic and sclerotic changes).

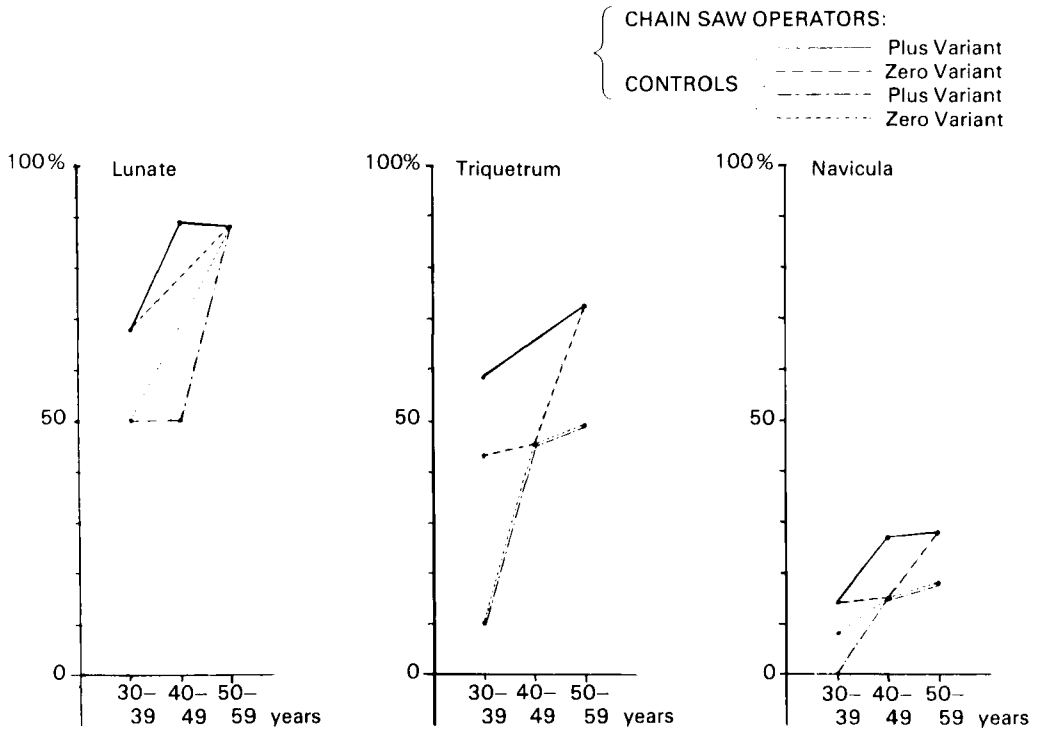

Figure 3. Relation between changes of the carpal bones and age.

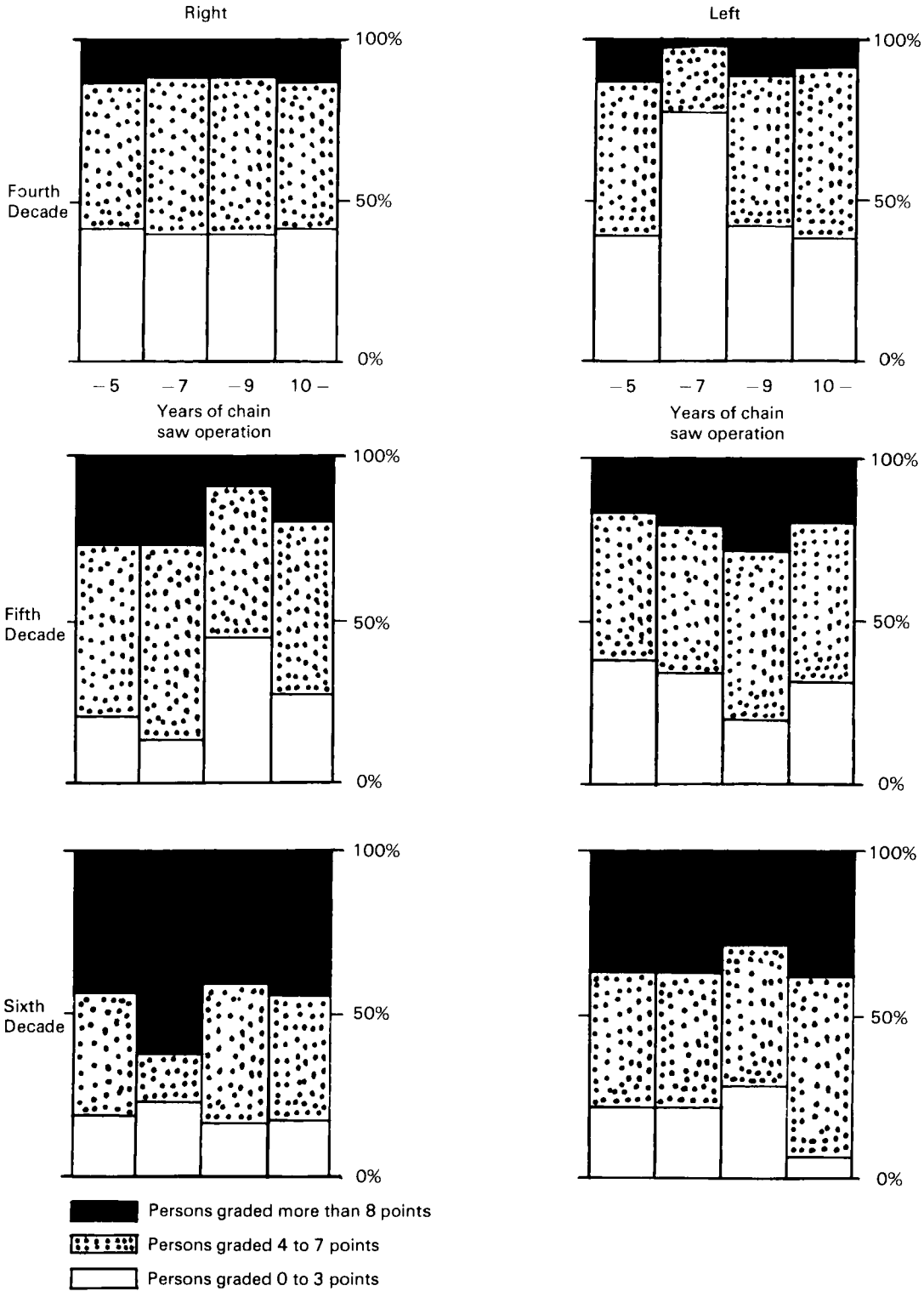

Figure 4. Radiological changes in the wrist joint related to years of chain saw operation.

As regards age-related changes in the wrist joints of Japanese forestry workers, degenerative changes in the distal radio-ulnar joint and the lunate bone were recorded as prominent findings.

In previous radiological studies of the wrist joints of chain saw operators (Hellstrom & Andersen 1972 and James et al. 1975), the existence of any special occupationally related changes could not be proven.

Special changes among chain saw operators or a close relationship between those changes found and the number of years spent operating chain saws could not be found in this study.

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