

Roquelaure Y, Raimbeau G et al. Occupational risk factors for radial tunnel syndrome in industrial workers. Scand J Work Environ Health 2000;26(6):507-513.

Design: Matched case-control study

Population/sample size/setting:

- 21 workers (17 women, 4 men, mean age 40) with radial tunnel syndrome (RTS) and 21 controls free of RTS symptoms (17 women, 4 men, mean age 40) matched for age, plant, and sex in 3 manufacturing plants in France
- The three manufacturing plants (TV, shoes, automobile brakes) employed about 2650 workers between Jan 1990 and Dec 1992

Main outcome measures:

- Cases were ascertained by two assessors who reviewed the company medical records, which are completed annually by the same occupational health physician
- RTS cases were included if they had (1) forearm pain in front of the radial head distal to the lateral epicondyle, (2) pain elicited by extension of the middle finger with elbow extended, (3) positive results of an electrophysiological examination, or (4) surgical release of the radial nerve (abnormal electrical studies were required for surgery)
- The 21 cases of RTS were considered severe, and occurred in association with CTS in 8 cases, lateral epicondylitis in 2 cases, and shoulder tendonitis in 1 case; all were operated on at the same hand surgery center
- Information on past medical history, BMI, smoking, alcohol, medications, pregnancy, leisure activities were gathered on both cases and controls
- Job site analysis for both cases and controls was done by direct observation by 2 assessors unaware of the diagnoses of the subjects; it included the types of tools used, the nature of the materials, the number of parts produced, work cadence, cold and vibration exposure, the number of motions per cycle time, and the length of the shortest elementary operations at the workstation
- BMI, obesity, smoking, obstetric history, and nonoccupational activity were not associated with the diagnosis of RTS
- In a multivariable conditional logistic regression model, three risk factors were identified: force >1 kg 10 times per hour, static work of the hand during the majority of the cycle time, and full extension of the elbow (0-45°) during work
- The logistic regression odds ratios (OR) were adjusted for work variables that had a p value of 0.2 or greater in the univariate analyses (this included the three risk factors in the final model, cycle time <30 seconds, duration of shortest elementary operation, forearm pro/supination over 30°, precise hand motions, and lack of job rotation between different workstations)
- For force >1 kg 10 times per hour, the adjusted OR was 9.0; for static work of the hand, the OR was 5.9, and for full extension of the elbow, the OR was 4.9

Authors' conclusions:

- RTS had a strong association with prehensile force; 1 kg was considered forceful because (1) few workers had force in excess of 2 kg, and (2) many of the tasks involved precise motions with pinching, rather than full hand grasping
- Static hand work occurred during activities such as holding a hand tool or pinching a piece of leather or electronic components; the duration of exposure to static hand work was often less than 1 minute because of the short cycle times of most tasks
- Arm extension, particularly when associated with twisting of the forearm, can rotate or axially stress the radial nerve deep branches
- No association was found with repetitiveness because all the workers had short cycle times and high repetitiveness
- Lack of job rotation was not identified as a risk factor, likely because the study lacked the statistical power to find an association

Comments:

- With only 21 cases, the number of variables that can be expected to work in a logistical model is only about 2 or 3; the lack of significant odds ratios with other variables is very likely to be attributable to the low numbers of cases
- The study has some strengths that many other similar studies lack: instead of self-report of exposure, direct workstation observation was done by assessors unaware of the health status of the workers; instead of diagnosis based on symptoms and signs only, electrodiagnostic studies were done on all cases
- Because all workers had some job characteristics in common (repetitive paced tasks), the power of the study to identify risks associated with these factors is very limited
- The study was done in an industrial plant setting; it is likely that most of the work day (6 hours or more) was spent exposed to the risk factors

Assessment: Adequate for a statement that RTS is associated with static hand work, force combined with repetition, and extension of the elbow from 0-45°