Osteoarthritis of the Thumb Carpometacarpal Joint in Women and Occupational Risk Factors: A Case–Control Study

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Purpose: Among other etiologic factors involved in first carpometacarpal (CMC) osteoarthritis (OA), occupational factors have been postulated as influencing the occurrence of this condition. Very few epidemiologic studies, however, have evaluated this topic. Determining the occupational risk factors is important in proposing preventive measures at the workplace. This case–control study was undertaken to explore whether there was a history of greater exposure to some occupational factors (eg, occupations, hand postures, tasks involving the CMC joint) in women requiring surgery for CMC OA compared with women with no CMC OA noted by history and physical examination.

Methods: The case subjects were 61 women surgically treated for primary CMC OA and the control subjects were 120 aged matched women without history or features of CMC OA. A detailed structured interview was developed to elicit information about age, smoking habits, medical history, lifestyle history, and occupational factors. Occupational factors were based on a detailed history of jobs, coded according to the International Standard Classification of Occupations. For the main occupation/job held for the longest duration and during an average working day, subjects were asked about hand posture or tasks involving requirements presumed to cause a strain or a high load to the CMC joint and about certain work conditions.

Results: Of the 61 case and 120 control subjects, 5 and 14, respectively, had never worked. There was no difference between the average number of jobs through the working lifetime of the group of case subjects compared with the group of control subjects. Logistic regression analysis showed that after adjustment for age, smoking status, obesity, CMC OA family history, hysterectomy history, parity, and occasional job, the following occupational factors were risk factors for CMC OA: occupations presumed to be associated with increased risk for CMC OA, occupations involving repetitive thumb use, and jobs perceived by the subject having not enough rest breaks during a day. The group of case subjects had a higher prevalence of hysterectomy history and family CMC OA history compared with the group of control subjects.

Conclusions: Although previous studies have reported that work and exposure history may lack precision as risk factors, our results give further evidence to support the role of certain occupational factors in the occurrence of CMC OA in women. (J Hand Surg 2007;32A: 459–465. Copyright © 2007 by the American Society for Surgery of the Hand.)

Type of study/level of evidence: Therapeutic II.

Key words: Thumb, osteoarthritis, carpometacarpal joint, risk factors, occupation.

The first carpometacarpal joint (CMC) is a common site of osteoarthritis (OA). A considerable amount of hand function can be lost with advanced CMC OA.[1,2] This condition may cause severe pain at the base of the thumb with use, with progressive loss of thumb motion and strength occurring later in the course of disease. The etiology and pathogenesis of CMC OA, however, remain un-

clear. Many risk factors have been suggested, including (1) inherent factors such as advanced age, female gender, congenital joint malformation, and genetic predisposition; and (2) acquired or environmental factors such as medical conditions, acute trauma, or long-term low-level stress.[3] Among environmental factors, the role of occupational factors remains an open question. A relationship between CMC OA and specific occupations has been reported,[4–6] but very few epidemiologic studies on the occupational factors associated with CMC OA have been performed.[7–10]

Further research is required to better define the relationship between occupational factors and CMC OA. A better identification of occupational factors could lead to preventive measures at the workplace, which might reduce the prevalence of this condition.

The purpose of this case-control study was to explore whether there was a history of greater exposure to some occupational factors (eg, occupations, hand postures, tasks involving the CMC joint) in women requiring surgery for CMC OA compared with women with no CMC OA noted by history and physical examination.

Materials and Methods

Study Populations

This study was conducted in 2 separate institutions: in a center of hand surgery (La Chataîgneraie Medical Center, Beaumont, France) for case subjects and in a department of orthopedic surgery (University Hospital, Clermont-Ferrand, France) for control subjects. These 2 institutions are located in the same urban area, and case and control subjects were drawn from the same district area.

The case subjects were 61 white women who were surgically treated for advanced primary CMC OA in a specialty hand surgery center.

Control subjects were matched by ethnicity and 5-year age interval and were consecutively recruited in a department of orthopedic surgery. They were admitted overnight to the orthopedic surgery department (University Hospital, Clermont-Ferrand, France) for injuries or traumas secondary to motor vehicle collision or fall. None of the control subjects had a history or showed features of CMC OA. On examination of their thumbs, we asked about or examined for decreased range of motion, pain at rest or with use, painful grind test, CMC joint enlargement, subluxation and adduction deformity of the CMC joint, metacarpophalangeal joint hyperextension, and Heberden's and Bouchard's nodes.[11] Excluded were patients mentally unable to comply with the administered questionnaire. Thus, 120 women were consecutively recruited into the control group.

All case and control subjects agreed to written informed consent to participate in this study.

Data Collection

A detailed structured interview was developed to elicit information about age, smoking habits, medical history, lifestyle history (sports, especially sports involving risks for the thumb such as golf and volley ball; leisure activities such as home improvement, domestic work), and occupational factors.

Medical history data were collected for the case subjects up to the date of the first diagnosis with special emphasis on factors known or supposed to contribute to the development of hand OA or CMC OA, assessed as yes/no, such as family history of CMC OA or at least one relative with CMC OA, thumb trauma history, diabetes mellitus, hypothyroidism, menopause, hysterectomy, parity, estrogen use, and use of oral contraceptives.

Weight and height were measured to calculate body mass index as weight (kg)/height $(m)^2$.

We asked about all occupations held for at least 6 months since leaving school. For the main occupation/job held for the longest duration (for case subjects up to the date of the diagnosis) and for an average working day, case and control subjects were asked about the following, assessed as yes/no:

- Hand posture or tasks involving requirements presumed to cause a strain or a high load on the CMC joint such as repetitive thumb use (>20 movements per minute and/or thumb flexion–extension at least once per minute), fine or strong pinch actions (tip, lateral, or palmar pinch); gripping/grasping; and pressure on the pad of the thumb. Visual aids were used to facilitate case and control subjects' memories.
- Work conditions such as whole body vibration, working with a hand-held vibrating tool, working with gloves, exposure to cold, and perceived adverse psychosocial or organizational conditions at work.

These items were selected because they had previously been identified as risk factors for hand OA or CMC OA.

All case and control subjects were interviewed face to face by the same interviewer using a detailed structured and standardized interview.