Research Paper

Osteochondroma: Review of 431 patients from one medical institution in South China

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ABSTRACT

Background: The geographic distribution of osteochondroma (OC) varies greatly around the world. There has been no recent report on OC in a large Chinese population. The aim of this study was to characterize OC by an epidemiological analysis of the clinical data from one medical institution in South China.
Methods: We searched medical electronic records from January 2001 to January 2016 in one large hospital in South China to identify patients with a definite diagnosis of OC. Their epidemiological data were collected and analyzed statistically, including gender, tumor site, age at first diagnosis and symptoms, local recurrence and malignant transformation. Differences between genders and between solitary osteochondroma (SO) and multiple osteochondroma (MO) were particularly analyzed.
Results: A total of 431 OC patients (291 males and 140 females; 329 SOs and 102 MOs) were identified. The gender ratio was 2.08 with a male predominance. OCs were mostly located around the knee (250 cases). 280 patients were in their 0s to 20s upon first diagnosis. The average age at the time of first diagnosis was 20.63 years for all, 18.47 years for males and 25.11 years for females (P = 0.000). OC recurred locally in 35 patients (15 SOs and 20 MOs), with a significant difference between SO/MO (P = 0.000) but not between genders (P = 0.100). The average interval from the primary surgery to local or malignant recurrence was 37.41 months. Malignant transformation was found in 5 patients (4 males and 1 female), showing no gender difference (P = 0.549).
Conclusions: OC may have a male predominance in Chinese population. It mostly occurred at 0–20 years of age and around the knee. Upon the first diagnosis of OC, the males tended to be younger than the females, and so did the MO patients than the SO ones. In addition, MO had a higher incidence of local recurrence. Intervals from primary surgery to local recurrence or malignant transformation in MO patients were longer than in SO patients.

1. Introduction

Osteochondroma (OC), also known as osteocartilaginous exostosis or cartilage-capped exostosis, is a broad (sessile) or narrow (peduncu-lated) skeletal protrusion comprised of marrow and cortical bone [1–4]. The cartilaginous cap is the site of growth, which normally diminishes after skeletal maturity. The tumor is presented as a locally benign neoplasm, which favors the meta-epiphyseal region of long bones like the distal femur, as well as the proximal tibia or humerus in the extremity [5,6,8]. Of all benign bone tumors, OC accounts for more than one-third, the most common benign bone tumor around the world [4,7–11,15]. Although it is benign, its biological behavior still has a malignant potential. Chondrosarcoma arising in osteochondroma has been recognized for many years [12–14]. It is generally believed that

malignant transformation of osteochondroma towards secondary peripheral chondrosarcoma is estimated to occur in 0.5–5% [14].

The epidemiological characteristics of OC from different countries or regions appear to be quite variable. The incidences of OC for Asian populations in India, Thailand and Iran were respectively 18.5% [15], 21.4% [16] and 31.9% [7]. When it comes to Europeans, it had an incidence of 17.2% [17] in the Black Sea region and 21.3% [18] in Croatia. The incidence was about 9.9% for American population [9], and 31.3% [8] in Mexico. In the Africans in Nigeria, it even ranged from 15.2% to 27.7% [19–22].

In China, He et al. [5] and Feng et al. [23] reported only primary bone tumor above 20 years. To date, however, the epidemiological survey on a large series of Chinese OC patients has not been found. Therefore, it is necessary to conduct surveys for knowledge of the
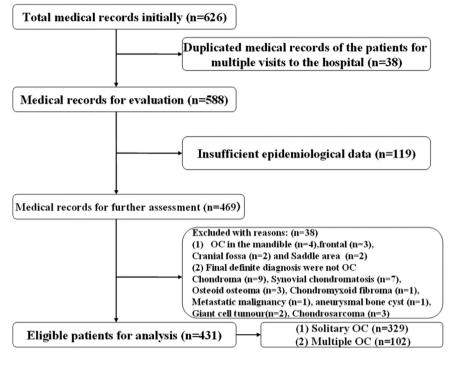
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current epidemiological characteristics of OC in Chinese population. The present study investigated the current epidemiological characteristics and clinical symptoms of solitary osteochondroma (SO) and multiple osteochondromas (MO) treated at our institution, Nanfang Hospital, Southern Medical University, Guangzhou, China.

2. Patients and methods

2.1. Study design and data sources

This retrospective analysis collected the data (including images) from the medical electronic records at our institution where in the period from January 2001 to January 2016, 431 patients with a definite diagnosis of OC, including SO and MO, were treated. We conducted eligible assessment when the initial records of the patients had been retrieved (Fig. 1).

2.2. Inclusion and exclusion criteria

Eligible patients were those with a confirmed diagnosis of body OC involving extremity bones and non-extremity bones (e.g. clavicle, scapula, rib, spine, etc.) and with complete medical records regarding gender, tumor localization, age at the first diagnosis, age upon symptom presentation or when the tumor was found, local recurrence and malignant transformation of osteochondroma, family history, and symptoms before surgery. All lesions acquired by biopsy or resection were analyzed at the Department of Clinical Pathology. The final histological diagnosis was correlated with clinical presentations and imaging findings by two authors.

We excluded from this present study those who: (1) had been diagnosed with OC in the head bones (e.g. skull, jaw, etc.); (2) had been suspected as patients with OC but without a final pathological diagnosis; (3) lacked sufficient medical information.

2.3. Analysis of data collected

We analyzed overall epidemiological data of OC to find the gender ratio, the most likely site, the peak age range and, in particular, the effects of gender on tumor site, age at the first diagnosis, local recurrence and malignant transformation of osteochondroma and clinical symptoms. We further compared our findings with those reported in other parts of China [23–26].

2.4. Statistical analysis

Continuous variables were expressed as the mean and standard deviation. Descriptive statistics were performed to calculate the frequency and percentages of the aforementioned variables. Age distribution was stratified into various groups at 10-year intervals. T-test was carried out to evaluate the differences of continuous variables between two genders. Chi-square test was applied to assess the differences of dichotomous variables. Statistically significant difference was defined as P value of < 0.05. The statistical analysis was done using the SPSS 17.0 software (Chicago, Illinois).

3. Results

3.1. Eligible patients for analysis

Patient identification: A total of 626 patients were identified initially. After the records were reviewed, we finally included 431 eligible patients for the present study. Of them, 426 (98.8%) were treated by at least one surgery at our institution and the remaining 5 only followed. The average follow-up was 7.21 years (range, from 1 to 16 years). The follow-up was done by a periodical clinical examination and radiography. The identification and inclusion process was illustrated in Fig. 1.

3.2. Findings of analysis

Of the eligible 431 cases, 329 were SO and 102 MO; 291 were males and 140 females, giving a gender ratio (male/female) of 2.08.

3.2.1. Primary tumor site and family history

In the present study, 313 tumors were located in the upper limb, 691 in the lower limb and 45 at other sites. 541 osteochondromas were on the left hemi-body, 499 on the right and 9 on other sites. However, significant differences were observed regarding SO and MO distribution