

RESEARCH ARTICLE

Giant Cell Tumor of Tendon Sheath

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*Research performed at Orthopaedic Hand and Upper Extremity Service, Massachusetts General Hospital, Boston, MA USA**Received: 22 October 2014**Accepted: 18 December 2014***Abstract**

Background: Giant cell tumor of tendon sheath (GCTTS) is often thought of as a volar finger mass. We hypothesized that GCTTS are equally common on the dorsal and volar aspects of the hand. In addition, we hypothesized that there are no factors associated with the location (volar versus dorsal) and largest measured dimension of a GCTTS.

Methods: A total of 126 patients with a pathological diagnosis of a GCTTS of the hand or finger were reviewed. Basic demographic and GCTTS specific information was obtained. Bivariable analyses were used to assess predicting factors for location (volar or dorsal side) and largest measured diameter of a GCTTS.

Results: Seventy-two tumors (57%) were on the volar side of the hand, 47 (37%) were dorsal, 6 (4.8%) were both dorsal and volar, and one was midaxial (0.79%). The most common site of a GCTTS was the index finger (30%). There were no factors significantly associated with the location (volar or dorsal, $n=119$) of the GCTTS. There were also no factors significantly associated with a larger diameter of a GCTTS.

Conclusions: A GCTTS was more frequently seen on the volar aspect of the hand. No significant factors associated with the location or an increased size of a GCTTS were found in this study.

Key words: Dorsal, Giant cell tumor of tendon sheath, Hand, Location, Size, Volar

Introduction

Giant cell tumor of tendon sheath (GCTTS) and ganglion cyst are the most common benign tumors of the hand (1, 2). In general GCTTS can present as a solitary subcutaneous nodule of the hand, but it can also occur in other parts of the body such as the spine, ankle, knee and feet (3, 4). However, with an approximate incidence of 1/50,000 per population it remains an uncommon condition (5). The incidence of GCTTS is higher in women than in men and mostly seen in the third to fifth decade (3, 6).

The results of previous research are inconsistent regarding whether GCTTS is more often volar or dorsal in the hand, with a tendency for it to occur more often on the volar aspect of the hand (7-10). The occurrence of a volar-sided GCTTS has been reported to range between 44 and 76% (7-11). The purpose of this study was to examine a large series of GCTTS in the hand to further assess the relative frequency of dorsal and volar GCTTS.

We hypothesized that GCTTS are equally common on the dorsal and volar aspects of the hand. In addition, we

hypothesized that there are no factors (i.e., demographic, clinical and pathological) associated with the location (volar versus dorsal side) and largest measured diameter of a GCTTS.

Materials and Methods

Under an IRB approved protocol 278 patients that had operative treatment of a GCTTS between January 2002 and November 2012 were identified using a database of pathology reports. The study was performed in a single tertiary care hospital and the procedures were performed by four experienced hand surgeons. Informed consent was waived for this medical record study. The medical records of all patients aged 18 years or older with a pathologically confirmed GCTTS of the finger or hand were reviewed retrospectively. Pregnant women (IRB mandated) and patients with a recurrence of a GCTTS already surgically treated in our center were excluded. We recorded sex, age, side, dorsal or volar location, finger or hand location and largest measured diameter of the GCTTS. The diameter was obtained from the pathology report.

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Statistical analysis

A post-hoc power analysis showed that based on the 57% prevalence of volar-sided GCTTS in 126 patients, the prevalence would be within 8.6% of the true proportion (17% width of confidence interval) based on a 95% confidence interval estimate.

Continuous variables are described with a mean, standard deviation and range.

Pearson Chi-square tests were conducted to determine the differences between two categorical variables. Wherever the minimum expected cell frequency was less than five the Fisher's Exact test was used. Student's t-tests were performed to determine the differences between continuous and dichotomous variables. A one-way analysis of variance (ANOVA) was conducted to determine the difference between continuous and categorical variables. All variables with significant ($P < 0.05$) or near significant ($P < 0.10$) relationships in the bivariable analysis were included in a multivariable logistic regression model using the backwards conditional method to assess predictors of a GCTTS on the volar or dorsal side.

Results

Patient characteristics

A total of 152 GCTTSs were excluded based on the exclusion criteria: two patients were younger than 18 years at time of the surgical tumor excision, ten were recurrent, and the medical record of one patient was not accessible. In addition, 139 GCTTSs were not located on the hand or finger: 76 (53%) on the knee, 24 (17%) on the foot or ankle, 17 (13%) on the hip or thigh, 8 (6%) on the wrist and 14 (12%) on other locations. This left 126 GCTTSs for analysis.

The mean age of the population was 46 ± 14 years (range, 18 to 81 years) and there were 74 women (59%) and 52 men (41%). Sixty-seven tumors (53%) were located on the right hand. The most common site was the index finger (30%). Seventy-two tumors (57%) were volar, 47 (37%) were dorsal, 6 (4.8%) were both dorsal and volar, and one was midaxial (0.79%) [Table 1]. The mean largest measured dimension (cm) of the GCTTS was 1.6 ± 0.61 cm (range, 0.50-3.4).

There was no significant relationship between the location (volar or dorsal, $n = 119$) of the GCTTS and sex,

age, size, side and whether the tumor was located on one of the fingers or hand. Since there were no relationships with $P < 0.10$, no multivariable logistic regression analysis was performed.

There was also no significant relationship between the largest measured diameter of the tumor and sex, age, side, location (volar, dorsal, both dorsal and volar, and midaxial) and whether the tumor was located on one of the fingers or the hand. Since there were no relationships with $P < 0.10$, no multivariable logistic regression analysis was performed.

Discussion

Our study confirmed that GCTTS is more often volar, but dorsal GCTTS are common. There were no independent predicting factors for the location or for an increased size of a GCTTS.

This study's limitation is the retrospective character which limited the type and completeness of the data, although missing data was limited.

Since GCTTS of the hand is an infrequent diagnosis, it is difficult to study. Current studies are limited to small retrospective series with a varying range (44-74%) of results for location (volar versus dorsal side) (7, 10-13). A recent systematic review by Fotiadis et al. did not look into volar versus dorsal location of GCTTS on digits (2). This study includes a relatively large series of patients. Our results are consistent with most prior research that states that GCTTS is more frequently seen in female patients on the volar side of the hand. The distribution of GCTTS by finger was also comparable with previous research, with the index finger as the most prevalent location (2, 9, 14). We were unable to find other studies that have tried to identify factors associated with the increased size of a GCTTS.

Giant cell tumors of tendon sheath were more prevalent on the volar side in this cohort. No factors associated with the location and an increasing size of a GCTTS were found. A multicenter prospective cohort study could provide more accurate and detailed information regarding predicting factors for location and size of a GCTTS.

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Table 1. Location of the GCTTS n = 119

Parameter	Volar		Dorsal		Total	
	N	%	N	%	N	%
Thumb	15	60	10	40	25	21
Index finger	25	69	11	31	36	30
Long finger	12	52	11	48	23	19
Ring finger	7	58	5	42	12	10
Small finger	5	45	6	55	11	9.2
Hand	8	67	4	33	12	10
Total	72	61	47	39	119	100

GCT: Giant Cell Tumor of Tendon Sheath.

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