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Association between Stenosing Tenosynovitis and Dupuytren's Contracture in the Hand

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Background: Both stenosing tenosynovitis and Dupuytren's contracture are common conditions encountered in hand surgery. Connections between 2 diseases have been suggested in literature. The purpose of this study was to examine whether there's an association between the 2 processes.

Methods: A retrospective chart review was performed to include all patients seen by a single surgeon between 2014 and 2017 with the diagnosis of either trigger finger or Dupuytren's contracture in the same hand. Patients' demographics, medical history, social and surgical histories are recorded. Univariate and multivariate analysis were conducted.

Results: A cohort of 238 patients was identified. One hundred ninety-two patients were diagnosed with trigger finger. Eighty-nine patients were diagnosed with Dupuytren's contracture. Forty-three patients carried both diagnoses. Median age was 61.6 (56–72). Half were male (50.4%) and 66.8% reported current alcohol intake. Other factors include history of former or current tobacco use (52.9%), diabetes (23.9%), and manual labor (31.1%). In the univariate model, trigger finger, sex, and age were significantly associated with the diagnosis of Dupuytren's contracture, and Dupuytren's contracture and sex were significantly associated with the trigger finger diagnosis. Diabetes, manual labor, use of alcohol and tobacco were not significant. In the multivariate model, age and trigger finger were significantly associated with Dupuytren's contracture.

Conclusions: Significant association between stenosing tenosynovitis and Dupuytren's contracture was identified in our patient cohort. Patients with stenosing tenosynovitis may be at an increased risk of developing Dupuytren's contracture or vice versa. *(Plast Reconstr Surg Glob Open 2019;7:e2088; doi: 10.1097/GOX.0000000000002088; Published online 11 January 2019.)*

INTRODUCTION

Dupuytren's contracture and stenosing tenosynovitis, or trigger finger, are 2 of the common pathologies encountered by hand surgeons. Dupuytren's contracture consists of pathologic production and deposition of collagens creating nodules and cords in the palm and digits. It can eventually lead to flexion contracture of joints and severely limit hand function.[1,2] Prevalence of Dupuytren's contracture varies with age, sex, and genetic background. It is commonly considered a disease of northern European descent but does occur in patients of all races and ethnicity.[3,4] Although it has a general prevalence around 3–6% in Caucasians globally, some studies report prevalence as high as over 50% in men aged 75–80 in certain European populations.[3,5,6] Additionally, Dupuytren's contracture has also been associated with smoking, alcoholism, diabetes, epilepsy, human immunodeficiency virus, rock climbing, manual labor, and certain diseases such as Ledderhose or Peyronie's disease.[3,4,7–14]

Stenosing tenosynovitis, or trigger finger, was first described by Notta in 1850.[15] It is caused by a size mismatch between the flexor tendon and the sheath/pulley system, most commonly the A1 pulley. This leads to clicking or catching of the flexor tendon as it glides through the sheath in flexion and extension. Patients may experience pain or locking with movement of the digits and

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subsequent impairment in hand function. The prevalence of trigger finger in the general population is around 2%.[16] Studies report it occurs most commonly in the sixth and seventh decades of life and also occurs 6 times more often in female comparing to male.[17] Aside from sex and age, literature has reported other comorbidities associated with trigger fingers, including manual labor, diabetes, hypothyroidism, carpal tunnel syndrome, amyloidosis, mucopolysaccharidosis, and rheumatoid arthritis, although the latter conditions arise from different pathological processes than idiopathic trigger digitis.[15,18–23]

Although both Dupuytren's disease and trigger finger share several common risk factors, no clear associations have been identified between the 2 disease processes. We noticed a high number of patients diagnosed with both pathologies in our patient population and the purpose of this study was to review our experience as well as report any identified risk factors.

METHODS

Our institutional review board approved this study. Patients diagnosed with either trigger digits or Dupuytren's contracture by the senior author between January 2014 and September 2017 were identified using our institution's clinical data warehouse platform, Informatics for Integrating Biology and the Bedside (i2b2). The International Classification of Diseases, Ninth Revision codes 727.03 (trigger finger) and 728.6 (contracture of palmar fascia) were used to query the database. All diagnoses were made by a single board-certified hand surgeon who is the senior author. Dupuytren's contracture was diagnosed with patient history of decreased range of motion in affected digits with presence of palpable nodule and cords. Hueston's tabletop test was employed to identify Metacarpophalangeal (MCP) and proximal interphalangeal (PIP) contractures and helped assessing the severity of disease. Interventions via injection of collagenase or surgical release were offered for patients who have generally greater than 30 degrees of contracture at MCP joints or any contracture at PIP joints. Diagnosis of trigger digits was made by the same hand surgeon based on the identification of pain at A1 pulley and catching or locking of affected digits with movement. A maximum of 2 steroid injections were generally offered before surgical release of A1 pulley were done. Exclusion criteria included systemic inflammatory diseases such as rheumatoid arthritis as the underlying pathology and management of trigger digits in these patients differs from that in their idiopathic counterparts.

Electronic medical records were manually reviewed for age at diagnosis, sex, digits involved, medical comorbidities, and social histories including alcohol use, tobacco use, and occupation. Patients carrying both diagnoses were included if the same or neighboring digits in the same hand were inflicted with both disease processes. Patients who carried diagnosis of Dupuytren's and trigger digits in separate hands were not included in the study since this is unlikely to have occurs due to interaction between the 2 pathology at a local tissue level. The chronicity of whether trigger digits or Dupuytren occurred first was not recorded since it is unlikely to be an accurate representation based on retrospective data since mild or subclinical form of each disease can be easily omitted in clinical documentation. History of injection with steroids or collagenase clostridium histolyticum was also recorded. Alcohol use was recorded as positive if consumption was current at clinic visits.

Descriptive analyses produced frequencies and percentages for categorical variables, and mean/median values for continuous variables. A standard statistical software package, SAS 9 (version 9.3; SAS Inst. Inc., Cary, N.C.) was used for univariate and multivariate analysis. Univariate analysis was used to model the association with hypothesized risk factors for developing trigger finger including age, sex, and Dupuytren's contracture as well as for modeling risk factors for developing Dupuytren's contracture, including age, sex, trigger finger, and manual labor. Chi-square tests were used to compare categorical variables. Independent *t* tests were used for continuous variables. Multivariable logistic regression was constructed to assess the predictors for the development of Dupuytren's contracture controlling for variables significant in the univariate analysis. Firth logistic regression was used to correct for quasi-complete separation in the initial logistic regression. An unadjusted alpha level of 0.05 for significance was used for all tests.

RESULTS

A total of 238 patients with either Dupuytren's contracture or stenosing tenosynovitis were identified and included in the study. Demographic data are illustrated in Table 1. Mean age was 61.6 years old (56.0–72.0) and 91.6% are Caucasian. In total, 50.4% are male, 23.9% have diabetes, 66.8% and 52.9% are current or previous alcohol, and tobacco users, respectively; 31.1% have a history of manual labor. Of the 238 patients, 192 patients were diagnosed with trigger finger and 89 patients were diagnosed with Dupuytren's contracture. Forty-three patients (18%) carried both diagnoses in the same or neighboring digits of the same hand (Table 2). Of the 192 patients with trigger finger, the majority elected to undergo at least

Table 1. Patient Demographics

Category	Frequency	%
Age (mean ± SD)	61.6 ± 13.5	
Race		
White	218	91.6
Non-White	20	8.4
Sex		
Male	120	50.4
Female	118	49.5
Alcohol intake		
Yes	159	66.8
No	75	31.5
Unknown	4	1.7
Diabetes mellitus		
Yes	57	23.9
No	181	76.1
Tobacco use		
Yes	126	52.9
No	112	47.1
Occupation		
Manual labor	74	31.1
Nonmanual labor	154	65.5
Unknown	8	3.4

Table 2. Management of Trigger Finger and Dupuytren's Contracture

Category	Frequency	%
History of trigger finger		
Yes	192	80.7
No	46	19.3
Preoperative steroid injection (n = 192)		
No	13	6.8
Yes	174	90.6
Unknown	5	2.6
Right hand (n = 112)	112	47.1
Digit 1	37	33.0
Digit 2	4	3.6
Digit 3	44	39.3
Digit 4	39	34.8
Digit 5	10	8.9
Left hands (n = 92)	92	38.7
Digit 1	21	22.8
Digit 2	7	7.6
Digit 3	32	34.8
Digit 4	31	33.7
Digit 5	13	14.1
Open A1 pulley release (n = 192)		
Yes	51	26.6
No	141	73.4
History of Dupuytren's contracture		
Yes	89	37.4
No	149	62.6
Collagenase injections (n = 89)		
Yes	8	9.0
No	81	91.0
Surgery (n = 89)		
Yes	23	25.8
No	66	74.2
History of both trigger finger and Dupuytren's contracture in thbe same or neighboring digits (n = 238)		
Yes	43	18.0
No	195	81.9

one steroid injection (n = 174) and 51 patients underwent eventual open A1 pulley release during the study period. Trigger fingers were more prevalent in the right hand (n = 112) compared with the left hand (n = 92) and more common in the third, fourth, and first digits. Of the 89 patients with Dupuytren's contracture, 8 patients received collagenase injection and 23 patients underwent open fasciectomy in the study period (Table 2).

In univariate analysis, trigger finger ($P < 0.0001$), sex ($P = 0.001$), and age ($P = 0.001$) were significantly associated with the development of Dupuytren's contracture. Also, Dupuytren's contracture ($P < 0.0001$) and sex ($P = 0.001$) were significantly associated with the development of trigger finger. However, diabetes, manual labor, and use of alcohol and tobacco were not found to be significant (Table 3).

In the multivariate analysis, multivariate logistic regression with Firth logistic regression demonstrated an association between age and Dupuytren's contracture [OR 1.045 (95% CI, 1.015–1.077)], as well as trigger finger and Dupuytren's contracture [OR 308.055 (95% CI, 18.343, >999.999)]. Association with sex was not found to be significant with multivariable logistic regression (Table 4). Trigger finger as a covariate in multivariate analysis initially resulted in a quasi-complete separation and thus firth logistic regression was used to correct for it.

Table 3. Univariate Analysis for Development of Dupuytren's Contracture and Stenosing Tenosynovitis

	P	
Category	Dupuytren's Contracture	Stenosing Tenosynovitis
Age*	0.001	0.158
Sex	0.001	0.001
History of diabetes mellitus	0.921	0.054
Tobacco use	0.598	0.497
Alcohol use	0.092	0.658
History of trigger finger	<0.0001	<0.0001
History of manual labor	0.849	0.257

*Age is continuous variable analyzed with independent *t* test. All other variables are categorical and analyzed with chi-square test.

DISCUSSION

Both Dupuytren's contracture and stenosing tenosynovitis or trigger finger are frequently encountered by practicing hand surgeons. It is not uncommon in practice to identify patients with clear stenosing flexor tenosynovitis with overlying subtle nodules or cords associated with early Dupuytren's contracture. As stressed by Burgess, if the surgeon simply opens the A1 pulley without addressing the overlying subtle cord/nodule, he or she may see early progression of Dupuytren's contracture, which may be of further burden/morbidity for the patient.[24] Yet, a myriad of publications exist in the literature regarding both subjects, but the exact pathogenesis of the 2 remains to be elucidated.

Concerning Dupuytren's contracture, progressive formation of nodules and cords in the palmar fascia leads to flexion contracture of d digits.[1,2] Histologic studies have shown increased production of type III collagen especially in the early phase as well as imbalance in cellular signal proteins such as transforming growth factor-β, mitogen activated protein kinase, Wnt/β-catenin, etc.[25–27] The current accepted model of Dupuytren's contracture is similar to that of scar formation and maturation.[28] In primary idiopathic trigger finger or thumb, a proposed mechanism consists of pathologic inflammatory changes secondary to repetitive friction between the flexor tendon and its enclosing sheath.[29] Histologically, fibrocartilaginous metaplasia occurs in the diseased flexor tendon and A1 pulley, which can cause the pulley to triple in thickness.[30]

Although treatment of trigger finger commonly targets the pathological inflammation with splinting, steroid injection, and percutaneous or open A1 pulley release, treatment of Dupuytren's contracture focuses on disruption of the pathological fascial nodule and cords with splinting, collagenase injection, needle aponeurotomy, and open palmar fasciectomy.[15,28,31–39] We do not generally offer

Table 4. Multivariate Logistic Regression with Firth Logistic Regression Correction for Development of Dupuytren's Contracture

Category	Odds Ratio (95% CI)
Age	1.045 (1.015–1.077)
Sex (male as reference)	0.498 (0.206–1.200)
History of trigger finger	308.055 (18.343, >999.999)

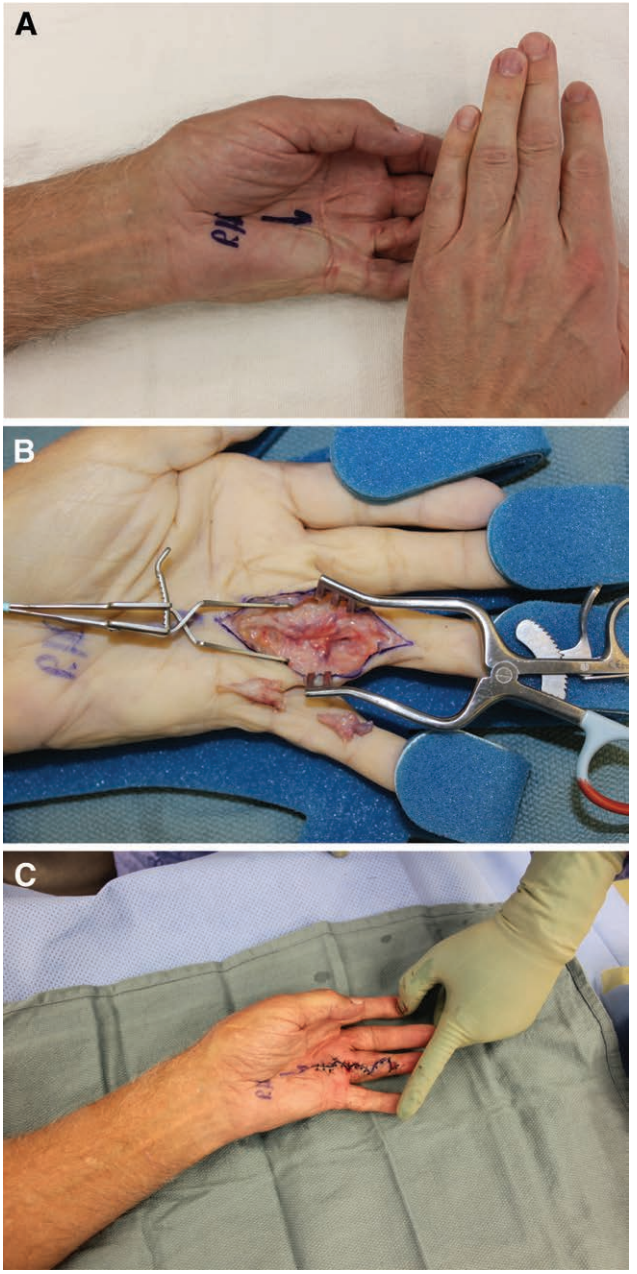

Fig. 1. Occurrence of symptomatic Dupuytren's disease in the same digit in a patient with previous A1 pulley release for stenosing tenosynovitis (A). Limited fasciectomy and excision disease cords and nodules (B). Restoration of passive range of motion following surgery (C).

steroid injections for Dupuytren's contracture. Although the 2 disease processes seem to be separate and distinct entities, they do share some common risk factors that have been reported in literature including, age, manual labor, diabetes.[4,7,8,22,23,28,40,41] The validity of these secondary risk factors remains a subject of debate. In our study, age is the only significant risk factor for both Dupuytren's contracture in both univariate and multivariate analysis. Sex was only significant in univariate analysis. Other factors such as manual labor, diabetes, alcohol, and smoking are not found to be significant, although diabetes was close to reach statistical significance for trigger fingers (Tables 3, 4). This may be due to a lack of power, as a larger sample size may be needed to reach significance. In addition, due to the retrospective nature of the study, we were not able to accurately assess certain variables such as amount of alcohol consumed, degree and length of manual labor performed, etc.

Interestingly, only a few articles have mentioned the possible association between Dupuytren's contracture and trigger finger in the past. In 1979, Parker[42] first reported 5 cases of Dupuytren's as a plausible cause of trigger finger in 1987, Burgess and Watson[24] reported a series of 47 patients with concomitant Dupuytren's contracture and trigger fingers, and noted a category of patients with Dupuytren's contracture with involvement of the vertical septa as a cause of tendon constriction. Furthermore, he stressed that operating through Dupuytren's-involved fascia for stenosing tenosynovitis causes marked postoperative reaction and fibrosis, and thus a concurrent local fasciectomy is warranted.[24]

In our study, we also noticed a large number of patients suffering from both pathologies (Fig. 1). Comparable to Burgess' study, we identified 43 patients with Dupuytren's contracture and stenosing tenosynovitis. A significant association was identified in our univariate and multivariate analyses. In addition to tendon constriction caused by involvement of the vertical septa in Dupuytren's contracture as pointed out by Burgess, we believe that stenosing tenosynovitis may possibly elicit or worsen Dupuytren's contracture through the process of inflammation in the neighboring tissue. This inflammation can occur as part of the trigger digit pathology as well as postoperative healing after surgical A1 pulley release. As type III collagen deposition in Dupuytren's contracture resembles that of scar formation, inflammation involving the tenosynovium may lead to processes of accelerated collagen deposition. And in individuals predisposed to Dupuytren's contracture whether genetically or simply by carrying a mild subclinical form of the disease, stenosing tenosynovitis may ultimately hasten the clinical presentation of Dupuytren's contracture.

Although we identified a significant association between the 2 entities in our patient cohort, further studies are needed to identify any direct causation that may exist. Nonetheless, practicing hand surgeons should be aware of the association between these 2 commonly encountered pathologies. It is worthwhile to examine and look for mild or early Dupuytren's contracture when patients present with trigger digits and vice versa. Patients should be educated preoperatively and a concurrent A1 pulley release and limited local fasciectomy should be considered in select patients. For those patients, an A1 pulley release could be done via individual surgeon's preferred incisions for limited fasciectomy.

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