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Observational Study

Prevalence and factors of work-related musculoskeletal disorders among hand surgeons

Abstract

BACKGROUND

The nature of tasks required by hand surgeons require both forceful and repetitive maneuvers, thus subjecting these surgeons to the risk of musculoskeletal (MSK) injuries during their years in practice.

4

AIM

To assess the prevalence, characteristics and impact of MSK disorders among hand surgeons.

METHODS

A modified version of the physical discomfort survey was sent to surgeons who were members of the American Society for Surgery of the Hand *via* e-mail. The collected data were analyzed using descriptive statistics, one-way analysis of variance, and Fisher's exact test. P values of <0.05 were considered statistically significant.

RESULTS

Of the 578 respondents, 60.4% ¹ reported that they had sustained a work-related MSK injury, of which the most common diagnoses were lateral elbow epicondylitis (18.7%),

low back pain (17.1%) and carpal tunnel syndrome (15.6%). Among those that reported an injury, 73.1 % required treatment and 29.2 % needed time off work as a direct result of their injury. The number of work-related injuries incurred by a surgeon increased significantly with increasing age ($P < 0.003$), increasing years in practice ($P < 0.001$) and higher case load ($P < 0.05$).

CONCLUSION

To our knowledge this study is the first of its kind to assess MSK injuries sustained by Hand surgeons with a high incidence. These results should increase awareness on this aspect and fuel future studies directed at preventing these types of work-related injuries, thus minimizing the financial and psychological burden on these surgeons and the healthcare system.

INTRODUCTION

Occupational injuries have gained recent attention in the medical literature, with studies exploring the prevalence of these injuries and possible predisposing factors. While all physicians are at risk of sustaining these injuries, surgeons have been identified as a high-risk group^[1-6].

Musculoskeletal (MSK) disorders have been identified as a common occupational risk for surgeons, which has been referred to as “an impending epidemic”^[1]. Their risk of occurrence increases especially when the surgeon is involved in tasks requiring repetitive and forceful movements, as it has been found that the prevalence of these injuries was more than 60% in practicing orthopaedic surgeons of different subspecialties^[3-5,7-9]. These injuries involved multiple MSK regions, including the lower back, elbow and wrist, thus requiring a large cohort of these injured surgeons to take time off work as a direct result of their sustained injuries.

Awareness of these MSK disorders and improvements in operative room ergonomics may have a substantial effect on the prevention of their occurrence^[10-12]. Unfortunately,

this effect isn't evident from the most recent literature, possibly due to the difficulty in applying some of the proposed ergonomical alterations and recommendations in the operative field^[10,13,14].

We conducted a study exploring prevalence of work-related MSK disorders among hand surgeons, with a goal to identify specific factors predisposing to these injuries and their impact on the surgeon's practice. Also, we aimed from this study to increase awareness of these types of injuries both to the practicing surgeon and members of the healthcare system in general.

MATERIALS AND METHODS

Members of the American Society for Surgery of the Hand were sent a modified version of the physical discomfort survey *via* e-mail. The initial email was sent in June 2016, followed by a reminder email in December 2017, and survey collection was closed by June 2017.

Questions pertaining to the surgeons general demographics (*e.g.*, age, gender, hand-dominance, type of practice, number of years in practice and annual caseload), in addition to questions exploring work related MSK injuries were included in the survey. The explored MSK injuries were divided into anatomical regions, including neck, shoulder, elbow/forearm, wrist/hand, hip, knee, foot and ankle, low back. In addition, participants were asked about both treatment required and time off work required due to the reported injuries, if any.

Statistical analyses

The collected data was analyzed using descriptive statistics, one-way analysis of variance, and Fisher's exact test using SPSS statistical package version 24 (SPSS Inc., Chicago, IL). *P* values of < 0.05 were considered statistically significant.

RESULTS

Five hundred and seventy-eight surgeons² completed the survey, with a respondent rate of 16.5%. The majority of respondents were males (84.8%), while 15.2% were females. More than half of the responding surgeons were younger than 55 years, while most have been in practice less than 30 years (Figure 1A and B). The vast majority of surgeons were practicing in an academic, community or private institute.

Concerning work related injuries, 60.4%¹ reported that they had sustained a work-related MSK injury (Table 1), of which the most common diagnoses were lateral elbow epicondylitis (18.7%), low back pain (17.1%) and carpal tunnel syndrome (15.6%) (Figure 2). The number of work-related injuries incurred by a surgeon increased significantly with increasing age ($P < 0.003$), increasing years in practice ($P < 0.001$)² and higher case load ($P < 0.05$). No association was found between sustained injuries and sex, hand dominance, nor type of practice.

Among those that reported an injury, 73.1 % required treatment, of which 11.8% required surgical management only, while 31.5% required both surgical and medical management for their injuries (Table 2). The need to undergo treatment or take time off due to the injury was associated with increased number of injuries ($P < 0.001$). In addition, surgeons were more likely to receive surgical treatment when they were > 56 years of age ($P < 0.001$) or had been in practice for > 30 years ($P < 0.001$).

Of the respondents, 29.2% needed time off work as a direct result of their injury (Table 2). We also found that surgeons were more likely to require time off work when they were > 56 years of age ($P < 0.001$) or had been in practice for > 21 years ($P < 0.001$).

DISCUSSION

We assessed the prevalence of work-related musculoskeletal injuries sustained by hand surgeons during their career. We found that of those responding to a survey, a high proportion of these surgeons (60.4%) reported a musculoskeletal injury sustained during work. A number of previous studies have assessed this prevalence in different specialties, as Davis *et al*^[3] reported a 44% prevalence of these work-related injuries in the general orthopaedic surgeon cohort. Specifically, Alqahtani *et al*^[4,5] surveyed both

the orthopaedic adult reconstructive and the orthopaedic trauma surgeon cohorts and found a similar prevalence of 66% in both studies. Alzahrani *et al*^[7] found that 67% of the 402 orthopaedic pediatric surgeon respondents ¹ reported that they sustained a work-related MSK injury.

The most common injuries reported by the surveyed hand surgeons in our cohort were lateral epicondylitis (18.7%) and low back pain (17.1%). We also found a high prevalence of carpal tunnel syndrome which was reported by more than 15% of the respondents. These common pathologies were similar to the previously published studies in different specialities, as low back pain and elbow injuries were the most common reported injuries by the surveyed surgeons.

Increasing age and years in practice were associated with the number of reported injuries in our cohort. We also found that surgeons with a higher case load were more likely to report a work-related MSK injury. Alqahtani *et al*^[5] and Alzahrani *et al*^[7] also found that increasing age and number of years in practice were independently associated with the number of reported MSK injuries in both the orthopaedic trauma and pediatric surgeon populations. In a study of 183 orthopaedic adult reconstruction surgeons, age > 55, practicing for > 20 years and increased case load were found to be associated with requiring time off work due to the sustained injury, but they found that these variables were not associated with the number of reported injuries^[4]. In our cohort we found similar results, as time off work was more likely in surgeons older than 56 years and surgeons who have been in practice for more than 21 years.

Identifying this high prevalence of MSK-injuries in practicing surgeons (who responded to the survey) is the first step in exploring factors that can be implemented to aid in reducing the risk of sustaining such injuries. Operative room ergonomics has been identified in recent studies as an area that requires significant improvement, especially in surgeon postures and movements^[10,14,15]. These include the use of specific body supports to improve posture and lower extremity compressive stockings to decrease the edema especially in long anticipated cases^[13,16]. In addition, making use of certain power tools for screw insertions can help decrease the burden of the repetitive

forceful movements required in this this surgeon population^[8]. As these factors have been found to possibly improve the surgeons experience in the operating room and decrease the risk of sustaining injuries, we believe that increased focus should be directed to exploring the true effect of these recommendations, in addition to identifying other modifications that may be of benefit to the surgeon and the healthcare system in general in preventing the occurrence of such work-related MSK injuries.

We believe that our study has some limitations that are common with these types of prevalence studies. Recall bias is always a risk in surveys that depend on the respondents ability to recall events or factors that occurred in the past. In addition, while the majority of the surgeons identify their injuries as work-related, other factors that may have come into effect cannot be ruled out. Another weakness is that the survey used was not assessed for validity or reliability, especially the included self-reported measures. It is possible that some deficiency can be identified in such types of surveys, but a validation study would be required to explore these possible missed indicators and can be an area for future research.

CONCLUSION

Our current study has shown a high occurrence of work-related MSK injuries sustained by hand surgeons. Increased awareness and preventative measures are key to minimize the financial and psychological burden on these surgeons and the healthcare system. To our knowledge this study is the first of its kind to assess these types of injuries in this surgeon sub-specialty.

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Figure Legends

Figure 1 Age distribution, ⁵ distribution of years in practice among survey participants.

A: Age distribution; B: Distribution of years in practice.

Figure 2 Musculoskeletal disorders and complaints among survey participants

Table 1 Percentage of surveyed hand surgeons with disorders and their requirement of time off work according to sex, age, hand dominance, type of practice, number of institutes, years in practice and annual caseload, *n* (%)

	Number of respondents	Number of respondents with injuries	Number of Injured requiring time off work
Age (yr)			
≤ 45	151	91 (60.3)	10 (6.6)
46-55	146	90 (61.6)	20 (13.7)
56-65	173	102 (59)	42 (24.3)
> 65	108	66 (61.1)	30 (27.8)
Sex			
Male	490	292 (59.6)	87 (17.8)
Female	88	57 (64.8)	15 (17)
Hand dominance			
Right	518	316 (61)	92 (17.8)
Left	60	33 (55)	10 (16.7)
Type of practice			
Academic	171	111 (64.9)	33 (19.3)
Community	186	114 (61.3)	38 (20.4)
Private	182	99 (54.4)	27 (14.8)
Other	39	25 (64.1)	4 (10.3)
Number of institutes			
1	544	329 (60.5)	98 (18.1)
> 1	34	20 (58.8)	4 (11.8)
Years in practice			
≤ 10	145	86 (59.3)	9 (6.2)
11-20	135	85 (63)	20 (14.8)
21-30	175	103 (58.9)	38 (21.7)

> 30	123	75 (61)	35 (28.5)
Annual caseload			
≤ 250	110	55 (50)	19 (17.3)
251-500	273	179 (65.6)	52 (19)
501-750	117	65 (55.6)	19 (16.2)
> 750	78	50 (64.1)	12 (15.4)

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Table 2 Percentage of surveyed hand surgeons with diagnosed disorders per region and number of respondents requiring treatment, requiring surgical treatment and requiring time-off work due to their musculoskeletal disorders

Region	Percentage of respondents with injuries	Percentage of injured respondents requiring treatment	Percentage of treated respondents requiring surgical treatment	Percentage of treated respondents requiring time-off work
Neck	30.4	13.9	3.6	4.0
Shoulder	23.1	15.0	4.9	4.0
Elbow	26.0	13.3	2.1	1.5
Forearm, wrist and hand	52.0	27.3	10.0	6.6
Hip and thigh	6.5	3.8	1.4	1.2
Knee and lower leg	12.3	8.1	5.2	3.4
Foot and ankle	9.5	6.7	1.2	1.2
Lower back	34.5	19.4	4.2	5.7

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PRIMARY SOURCES

1	Alqahtani, Saad M., Mohammad M. Alzahrani, and Michael Tanzer. "Adult Reconstructive Surgery: A High-Risk Profession for Work-Related Injuries", The Journal of Arthroplasty, 2015. <small>Crossref</small>	87 words — 4%
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