Left and Non-Dominant Shoulders Were More Frequently Affected in Patients with Frozen Shoulder: A Systematic Review and Meta‐Analysis

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Abstract

**Background:** If trauma has a considerable impact on frozen shoulder, the right or dominant shoulder is more frequently affected than the left or non‐dominant shoulder. Herein it is examined whether the right or dominant shoulder was more frequently affected in patients with frozen shoulder using PubMed.

**Materials and methods:** PubMed was searched to retrieve relevant studies. The search term used was "frozen shoulder." The studies obtained were published between 1966 and 2007, and included 10 or more patients with only one affected side. Patients with bilateral shoulder involvement were excluded.

**Results:** The right shoulder was affected in 718 patients (46.3%), while the left shoulder was affected in 833 (53.7%). The dominant shoulder was affected in 298 patients (41.1%), while the non‐dominant shoulder was affected in 427 (58.9%). The left shoulder was affected significantly more than the right shoulder (p<0.01). The non‐dominant shoulder was affected significantly more than the dominant shoulder (p<0.01).

**Conclusion:** Trauma including repeated minor trauma is less likely to cause frozen shoulder, or the influence of brain abnormalities is stronger than that of trauma. The left shoulder may have been more frequently affected because of the side‐to‐side asymmetry of the brain for various reasons. If this hypothesis is correct, brain abnormalities may be one cause of frozen shoulder, suggesting that central neuropathic pain or braingenic pain contributes to the pain associated with frozen shoulder. The right and dominant shoulders were less frequently affected in patients with frozen shoulder.

Keywords: Frozen shoulder; Side‐to‐side asymmetry; Dominant hand; Right; Left; Frequency

Introduction

Trauma including repeated minor trauma may cause frozen shoulder [1]. If trauma has a considerable impact on frozen shoulder, the right or dominant shoulder is more frequently affected than the left or non‐dominant shoulder. Herein it is examined whether the right or dominant shoulder was more frequently affected using PubMed.

Materials and Methods

PubMed was searched to retrieve relevant studies. The search term used was "frozen shoulder." The following inclusion criteria were employed: (1) Studies published between 1966 and 2007; (2) Studies written in English; (3) Studies including 10 or more patients with only one affected side. Patients with bilateral shoulder involvement were excluded; (4) Studies comprising full reports (no letters or abstracts); (5) If one group published 2 or more studies, only one study with the largest number of patients was used; (6) The study by Weiser [2] reported the following: the left and right side were equally involved (n=100). The study by Bunker et al. [3] demonstrated that "The left and right shoulders were equally involved (n=50). Therefore, the right side is considered to be involved in 50% of patients in these studies [2,3] (Figure 1). The goodness‐of‐fit test was applied. A P value<0.01 was considered to be significant.

Results

The right shoulder was affected in 718 patients (46.3%), while the left shoulder was affected in 833 (53.7%). The dominant shoulder was affected in 298 patients (41.1%), while the non‐dominant shoulder was affected in 427 (58.9%). The left shoulder was affected significantly more than the right shoulder (p<0.01). The non‐dominant shoulder was affected significantly more than the dominant shoulder (p<0.01) (Table 1).
primary (idiopathic) frozen shoulder was inconclusive [4]. Trauma including repeated minor trauma may cause frozen shoulder [1]. If this hypothesis is correct, the right or dominant shoulder is more frequently affected. However, in contrast to predictions, the left and non-dominant shoulders were more frequently affected. Trauma including repeated minor trauma may be less likely to cause frozen shoulder, while the influence of brain abnormalities appears to be stronger than that of trauma.

It currently remains unclear why the left and non-dominant shoulders are more frequently affected. Based on previous findings, Merskey et al. reported that pain was more often lateralized on the left, except in the case of trigeminal neuralgia [5]. Previous experimental evidence implied that the right hemisphere was less efficient than the left in processing cutaneous sensory input [5]. Ertunc et al. reported that the herpes zoster infection frequency was higher in right-handed patients and more frequently appeared in the left body side of females [6]. Dane et al. showed that the cell-mediated hypersensitivity was stronger in the left side of the body than the right based on the tuberculin test with 22 male and 36 female healthy high school students [7]. The left shoulder may have been more frequently affected by frozen shoulder because of the side-to-side asymmetry of the brain for various reasons. If this hypothesis is correct, brain abnormalities are one of the causes of frozen shoulder, suggesting that central neuropathic pain or braingenic pain contributes to the pain associated with frozen shoulder.

The non-dominant shoulder (58.9%) was more frequently affected than the left shoulder (53.7%). The reason for this remains unknown. It may be due to the roles of the right brain in right-handedness and those of the left brain in left-handedness not necessarily being the same, as well as the roles of the right brain in left-handedness and those of the left brain in right-handedness not necessarily being the same [2,3,8-42].

**Limitations**

Some physicians may believe that trauma including repeated minor trauma causes frozen shoulder. These physicians may be more likely to think that the right or dominant shoulder is more frequently affected than the left or non-dominant shoulder. Therefore, in case that the left or non-dominant shoulder is more frequently affected than the right or
dominant shoulder, it is possible that they are more likely to interested in it and report it. These may cause a bias.

Conclusion
The right shoulder was affected in 718 patients (46.3%), while the left shoulder was affected in 833 (53.7%). The dominant shoulder was affected in 298 patients (41.1%), while the non-dominant shoulder was affected in 427 (58.9%). The left shoulder was affected significantly more than the right shoulder (p<0.01). The non-dominant shoulder was affected significantly more than the dominant shoulder (p<0.01).

Conflict of Interest
The author confirms that this article content has no conflict of interest.

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References