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## A systematic review of the association between a single strenuous event and the development of an inguinal hernia: A medicolegal grey area

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### ABSTRACT

**Background:** Inguinal hernia is a common surgical presentation. Evidence for its causation regarding occupational and recreational physical exposures is limited. The aim of this study is to conduct a systematic review objectively evaluating the evidence for a causal link between a single strenuous event and the development of an inguinal hernia.

**Method:** A systematic review was carried out in accordance with PRISMA guidelines. PubMed, Ovid Embase, SCOPUS, and Cochrane Library were searched. In addition, the ISRCTN register, [ClinicalTrials.gov](http://ClinicalTrials.gov), ICTR Platform, and EU Clinical Trials Register were searched. Identified publications were collated and both reviewers independently reviewed their contents.

**Findings:** 5508 records were identified, resulting in 5 studies being selected. These 5 studies were all case series. Of 957 patients identified, 1003 hernias were described, of which 983 were inguinal hernias which 255 (26%) were attributed by patients to a single strenuous event.

Only two of these studies applied Smith's Criteria (causation of a hernia from a single strenuous event): officially reported, severe pain at the time of the event, no prior history of inguinal hernia, and the diagnosis was made by a doctor within 30 days (preferably 3 days). Only 2 of 54 patients (4%) met all four criteria and so could be considered as having an inguinal hernia relating to a single strenuous event.

**Conclusion:** Many patients associate hernias to a single episode, however upon application of more stringent criteria such as Smith's, a much smaller proportion are deemed to be actually attributable to a single strenuous event.

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## Introduction

Inguinal hernias are a common surgical condition, with a lifetime risk of 27% for males and 3% for females in the UK.<sup>1</sup> Repairs associated with these are one of the most common general surgical interventions in Europe and North America.<sup>2,3</sup>

The subject of occupational risk factors for developing inguinal hernia is controversial. There is a commonly held perception that an inguinal hernia can be the result of a strenuous event. Although higher rates of inguinal hernias in manual labourers have been reported by individual studies, a previous systematic review of this data was shown to be inconclusive.<sup>4,5</sup> Furthermore there has been no robust study examining association between single strenuous events and inguinal hernia development.

This is an important area of investigation as it is a common claim for compensation, on which general surgeons may be asked to give their opinion on whether the hernia was caused by a strenuous event in the workplace. If such claims are unfounded they place a burden on the legal system, businesses involved, and ultimately the tax payer. There is a need to examine the causal link between single strenuous event and the development of inguinal hernia.

## Objectives

To conduct a systematic review to evaluate the evidence of a causal link between a single strenuous event and the development of an inguinal hernia.

## Material and methods

This systematic review was conducted in accordance to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement.<sup>6</sup> A review protocol was registered with the PROSPERO systematic review database on 2nd November 2017; registration number: CRD42017048549.<sup>7</sup>

### Study eligibility criteria

Below are characteristics of individual studies required for their inclusion in this review in the PICOS format:

- Participants

Adult patients diagnosed with an inguinal hernia. Irrespective of presentation (elective or emergency) or hospital setting (inpatient or outpatient).

- Intervention (Exposure)

Self reported single strenuous incident which the patient perceived to be the development of their hernia.

- Control

Patients with hernia, but without a reported single strenuous incident perceived to be related.

- Outcomes

Incidence of hernia associated with a single strenuous event.

- Study design

No limitation was placed in study design.

Reporting characteristics for inclusion were studies published in peer-reviewed journals. No studies were excluded based on year of publication or language.

### Information sources and search

Four databases: PubMed, Ovid Embase, SCOPUS, and Cochrane Library were searched. In addition to these four trial registries: [ClinicalTrials.gov](http://ClinicalTrials.gov), European Clinical Trials Register, ISRCTN Register, and the International Clinical Trials Registry Platform were searched.

For PubMed, the search was conducted using both MeSH terms and the advanced search option. The MeSH terms 'Hernia, Abdominal' AND ('Accidents, Occupational' OR 'Occupational Exposure' OR 'Exercise') were used. An advanced search was conducted using the terms 'Hernia' AND ('Work related' OR 'Occupation' OR 'Physical Activity' OR 'Physical Load' OR 'Lifting' OR 'Single Strenuous Event' OR 'Strenuous' OR 'Single Event'). Ovid Embase and SCOPUS were also searched with the same terms. The Cochrane Library and trial registries were searched using the term 'Hernia'. Trial registries were all searched using the term 'Hernia'. The literature search was performed on 8th October 2017.

### Study selection and data collection process

Two independent reviewers, authors one and two, reviewed all titles and then abstracts, placing any screened citations into a database. Duplicates were then eliminated and if possible using the abstracts available a decision was made on its inclusion. The full text was then assessed and disagreements between reviewers were resolved by consensus, or if necessary arbitration by a senior author. The .pdf files of the selected studies were then exported to Mendeley reference manager.<sup>8</sup> Once each author had completed data extraction, the data files were electronically compared and discrepancies in data entry were investigated and resolved.

### Data items

The following variables were sought and collected into an Excel spreadsheet:

- Basic information

First author, publication year, study type and assessment type.

- Demographic information

Total patients, number males, number females, minimum age, maximum age, average/median age.

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