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Review Article

**HERNIA RISK FACTORS: SYSTEMATIC
LITERATURE REVIEW**

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Abstract:

This review is aiming to discuss the hernia risk factors, the presented review was conducted by searching in Medline, Embase, Web of Science, Science Direct, BMJ journal and Google Scholar for, researches, review articles and reports, published over the past years. were searched up to November 2018 for published and unpublished studies and without language restrictions, if several studies had similar findings, we randomly selected one or two to avoid repetitive results. On the basis of findings and results this review found chromosomal abnormalities, an age of 40–59 years, while Black race, obesity, COPD, low preoperative serum albumin, steroid use, radical retropubic prostatectomy, laparoscopic funduplications

Keywords: hernia, risk factor

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INTRODUCTION:

Congenital diaphragmatic hernia (CDH), the displacement of abdominal contents into the thoracic cavity through an incompletely formed diaphragm, affects approximately 1000 infants each year in the United States.¹ Pulmonary hypoplasia is frequently associated with CDH and often causes death from respiratory failure, despite surgical repair of the defect. In the early 1990s, the estimated cost of the first hospitalization for patients with CDH in the United States was more than \$230 million per year.² Survivors of congenital diaphragmatic hernia often have ongoing respiratory, growth and neuro developmental problems, increasing the burden of the condition on patients, families, and society.³ The diaphragm develops between the 3rd and 7th week of gestation. Four types of CDH exist: Bochdalek (posterolateral) hernia, anterolateral hernia (absent diaphragm), Morgagni (parasternal, retrosternal, or anterior) hernia, and the pars sternalis hernia (diaphragmatic hernia, pericardial defect, sternal defect, omphalocele). Each type may have distinct embryologic, clinical, and epidemiologic characteristics.⁴ The posterolateral diaphragmatic hernia is the most common diaphragmatic hernia detected in the neonatal period and is associated with a high mortality rate. In contrast, the Morgagni hernia infrequently presents in the neonatal period, and it rarely causes death. Although the etiology of CDH is mostly unknown, some patients have associated chromosomal abnormalities and single-gene disorders. In addition, some evidence for teratogenic causes has been found. Quinine⁵ (an antimalarial) and phenmetrazine (Tibboel and Gaag, 1996) (an amphetamine analogue) have been linked to CDH in case reports. Nitrofan⁶ (a pesticide and thyroid hormone analogue) and vitamin A deficiency⁷ In Barrett's esophagus, the normal squamous epithelium lining the distal esophagus becomes replaced by a specialized columnar epithelium with intestinal metaplasia. It represents a predisposing factor for the development of esophageal adenocarcinoma.^{8,9} Barrett's esophagus is considered an acquired lesion that results from chronic, long-standing gastro esophageal reflux.^{10,11} The typical symptoms of Barrett's esophagus resemble those of gastro esophageal reflux disease (GERD).^{12,13} Abdominal wall hernia is defined as any protrusion of a peritoneal-lined sac through the musculoaponeurotic covering of the abdomen, including inguinal, incisional, umbilical, femoral, epigastric, spigelian, lumbar, and other more rare types of hernias.¹⁴ Abdominal wall hernia repairs are the most common general surgical procedure performed in the United States. Hernia repairs, second only to cataracts, are one of the most common

major surgical procedures performed in the United States each year with over 990,000 cases performed annually.¹⁵ Inguinal hernia repairs (65.7%) comprise the majority of all abdominal wall hernia repairs performed in the United States followed by umbilical hernia repairs (15.7%), incisional hernia repairs (9.1%), femoral hernia repairs (2.4%), and other types of hernia repairs (7.1%).¹⁶

Adult umbilical hernia is a common surgical condition mainly encountered in the fifth and sixth decade of life.^{17,18} Ninety percent of all adult umbilical hernias are acquired.¹⁹ For the majority of the symptomatic and asymptomatic umbilical hernias, repair is proposed. Especially so since incarcerated umbilical hernias are reported to be responsible for 13% of all incarcerated hernias and that in one fifth of all incarcerated umbilical hernias a bowel resection is required.²⁰ Surgical repair may be achieved through double breasting (Mayo repair)²¹, simple suture repair and the use of mesh. Despite the frequency of the umbilical hernia repair procedure, disappointingly high recurrence rates, up to 54% after simple suture repair, have been reported.²² For the Mayo repair, recurrence rates of up to 40 and 54% have been documented in the literature for umbilical hernias and incisional hernias, respectively.^{23,24}

METHODS:

The present review was conducted December 2018 in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) declaration standards for systematic reviews. We reviewed all the topics on hernia risk factors, such as chromosomal abnormalities, an age of 40–59 years, while Black race, obesity, COPD, low preoperative serum albumin, steroid use, radical retropubic prostatectomy, laparoscopic fundoplication. To achieve this goal, we searched Medline, Embase, Web of Science, Science Direct, and Google Scholar for, researches, review articles and reports, published over the past 15 years.

Our search was completed without language restrictions. Then we extracted data on study year, study design, and key outcome on diabetes. The selected studies were summarized and unreproducible studies were excluded. Selected data is shown in the Table 1.

Inclusion criteria

Inclusion criteria were hernia risk factors: inguinal, umbilical, incisional, congenital diaphragmatic, adult, children.

Exclusion criteria

Irrelevant articles [not related to the aim of this review and articles that did not meet the inclusion

criteria in this review.

Data extraction and analysis

Information relating to each of the systematic review question elements was extracted from the studies and collated in qualitative tables. Direct analysis of the studies of hernia risk factors.

RESULTS:

The birth prevalence of congenital diaphragmatic hernia was 2.4 per 10,000 births. Infants with isolated congenital diaphragmatic hernia were more likely to be premature, macrosomic, and male than their birth cohort. About one-third of affected infants had additional major defects. Of infants with congenital diaphragmatic hernia, 8% had known syndromes, most commonly chromosomal abnormalities. During the study period, the percentage of infants with congenital diaphragmatic hernia who survived to 1 year of age increased from 19% (1968–71) to about 54% (1996–99). During the last 10 years of the study, infants who were of low birth weight, had a syndrome, or were prenatally diagnosed were more likely to die than other infants with congenital diaphragmatic hernia²⁵

The cumulative incidence of hospitalization with inguinal hernia was 6.3 percent at 20 years and was much higher among men (13.9 percent; 500 cases) than among women (2.1 percent; 120 cases) (figure 1). Adjusted for age, the inguinal hernia hazard ratio for men relative to women was 7.5 (95 percent confidence interval (CI): 6.2, 9.2). Consequently, more detailed analyses were conducted in men. The 20-year cumulative incidence of inguinal hernia among men increased with baseline age: 7.3 percent at age 24–39 years, 14.8 percent at age 40–59 years, and 22.8 percent at age 60–74 years (table 1, figure 2). White men had almost twice the 20-year cumulative incidence (15.1 percent) of Black men (8.4 percent). The relation of inguinal hernia with possible risk factors was examined in age-adjusted analysis. A lower incidence of inguinal hernia was associated with higher levels of some weight-related factors, including body mass index and maximum lifetime weight (table 1, figure 3). Men reporting a doctor-diagnosed hiatal hernia had a higher incidence of inguinal hernia. Current smokers had a borderline lower risk of inguinal hernia. Factors that were unrelated to inguinal hernia included nonrecreational

and recreational physical activity, constipation or bowel movement frequency, chronic cough, chronic obstructive pulmonary disease, alcohol intake, minimum adult weight, weight loss or weight gain, height, and education.²⁶

The mean age of the study cohort was 60-14 and the mean ASA class was 2.4 0.7. Descriptive data revealed 99% were male, 43% used tobacco, 8.4% were diabetic, 7.4% used alcohol, 6.3% had chronic obstructive pulmonary disease (COPD), 2.1% were malnourished (defined as > 10% weight loss over prior 6 months), 1.6% used steroids, 1.2% had ascites, and 0.2% had coronary artery disease (CAD). The mortality rate was low at 1% but the morbidity rate was higher with a 4.3% incidence of wound infections and a 15.1% incidence of recurrent hernias. The mean preoperative serum albumin level was 4.1 0.6 g/dL, and the mean hospital length of stay was 1.4 4.8 days. Multiple logistic and linear regression analyses documented that CAD, COPD, low preoperative serum albumin, and steroid use were independent risk factors for increased postoperative wound infections ($P < 0.05$) and increased hospital length of stay ($P < 0.05$).²⁷

The incidence of hernia was 13.6%, 7.6% and 3.1% in the prostatectomy, lymph node dissection and unoperated group, respectively. The difference was statistically significant in the prostatectomy and unoperated groups according to the Mantel-Cox log rank test and Cox proportional hazards rate. Previous hernial surgery and post-prostatectomy anastomotic stricture were more common in patients with an inguinal hernia after prostatectomy.²⁸

Nine patients (five male) with a mean age 54 years (range, 37–75) developed trocar site herniation, for an overall prevalence of 3%. The mean interval between surgery and diagnosis was 12 months (range, 4–21). In all patients, the hernia occurred at the supraumbilical camera port site. Patients with trocar hernias tended to have a higher body mass index (BMI) than those without hernias (mean BMI, 29.4 kg/m² vs 27.2 kg/m², $p = 0.13$). None of the patients developed intestinal obstruction as a consequence of herniation. To date, all but one of the hernias have been repaired. Six of them required the insertion of a prosthetic mesh.²⁹

Table (1) Results from Sequencing Studies.

Author and year	Sample	Risk factors	Key point
Mary M2003 ²⁵	1,029,143). Infants with congenital diaphragmatic hernia	chromosomal abnormalities	the death rate from congenital diaphragmatic hernia remain substantial ,highlighting the need to identify mechanisms for primary prevention.
Constance E. Ruhl2006 ²⁶	(5,316 men and 8,136 women	an age of 40–59 years , while Black race and obesity	inguinal hernias are common among men, especially with aging.
James D2002 ²⁷	6301 noncardiac surgical patients	COPD, low preoperative serum albumin and steroid use	consideration should be given to optimizing patient's cardiopulmonary and nutritional status before abdominal wall hernia repair
PAR L2001 ²⁸	375, 184 and 65 men	radical retropubic prostatectomy	The incidence of inguinal hernia is clearly increased in men who have undergone radical retro pubic prostatectomy plus pelvic lymph node dissection compared with those who undergo no surgery for prostate cancer
D. J. Bowrey2001 ²⁹	The records of 320 patients undergoing primary laparoscopic fundoplication	laparoscopic fundoplication	The prevalence of trocar site herniation after laparoscopic fundoplication was minimal at 3%

DISCUSSION:

The birth prevalence of CDH has varied depending on the population studied and the methods of case ascertainment used. Reported birth prevalence for CDH has ranged from 1.4/10,000 (Jackson, 1967) to 4.5/10,000 births (Butler, 1962). Three population-based studies of CDH reported birth prevalences that ranged from 2.7/10,000 to 3.6/10,000 (Torfs et al., 1992; Wenstrom et al., 1991; Steinhorn et al., 1994). The population-based study with the highest birth prevalence (Steinhorn et al., 1994) included diaphragmatic eventration, which we did not include because this abnormality is not known to be caused by a defect of the primitive diaphragm (Gray and Skandalakis, 1972). One possible explanation for our population having a lower birth prevalence (2.4/10,000 births) than that found in Iowa (Wenstrom et al., 1991), California (Torfs et al., 1992), and Minnesota (Steinhorn et al., 1994) might be that MACDP represents, almost exclusively, an urban population, and at least one study has suggested that there may be a higher rate of CDH among persons who live in rural areas (Torfs et al., 1992). In fact, the birth prevalence of isolated cases in our study (1.53/10,000) closely matches the birth prevalence of isolated CDH in urban areas of California (1.65/10,000), which was found to be lower than the rate of isolated CDH in rural California (2.16/10,000 births) (Torfs et al., 1992). Subsequent population-based studies of CDH need to further test the hypothesis that higher rates of CDH

may exist in rural communities; if true, this finding could provide insight into the etiology of CDH.²⁵

Possibly the clearest message of this study is how commonly inguinal hernia occurs. Many health-care providers may consider inguinal hernia to be largely limited to male infants with an anatomical defect in the inguinal canal (18). In contrast, we have documented that inguinal hernia occurs frequently among adults, such that well over one quarter of adult men in the United States would be expected to have a medically recognized inguinal hernia. In fact, the incidence of inguinal hernia increased noticeably with age among men.²⁶

Abdominal wall hernia repairs are one of the most common major surgical procedures performed in the United States each year with almost 1,000,000 cases performed annually and an incidence of mortality of 2.5 per 100,000 population [2,5]. Nilsson et al. prospectively studied 4879 patients undergoing inguinal hernia repairs. The authors documented a mortality rate of 0.07% for elective operations and 3.5% for emergent operations [11]. Similarly; incisional hernia repairs have a documented mortality rate of 0.3% for elective cases and 1.1% for complicated cases.²⁷

Because our study is retrospective, it has the usual weaknesses of such a design. Larger groups would have led to clearer results and adequate statistical

power estimations may have been performed. However, due to the sparse data available in the literature on post-radical retropubic prostatectomy inguinal hernia we still think that our results are interesting and clearly contribute to the current knowledge on the subject. Furthermore, to our knowledge postprostatectomy inguinal hernial development has not previously been compared with a control group of well matched, unoperated patients with prostate cancer.²⁸

The current study identified a 3% minimum prevalence of trocar site herniation after laparoscopic fundoplication. This figure is in close agreement with four previous studies examining the frequency of incisional herniation after laparoscopic abdominal surgery (1–2%) [1, 15, 17, 18, 23]. Thus, the risk of incisional herniation is approximately three times less after laparoscopic fundoplication than after open fundoplication [29].

CONCLUSIONS:

The results of this studies show the hernia risk factors. On the basis of findings and results this review found chromosomal abnormalities, an age of 40–59 years, while Black race, obesity, COPD, low preoperative serum albumin, steroid use, radical retropubic prostatectomy, laparoscopic fundoplication are most common risk factors of hernia.

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