



The Clinical Study: Impact of Benign Prostate Hyperplasia on the Inguinal Hernia Formation

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Abstract: The aim of this study was to explore impact of Benign Prostate Hyperplasia on inguinal hernia formation in elder men through a clinical trial among Benign Prostate Hyperplasia of the elderly patients who undergo inguinal hernia surgery. Three routine preoperative examinations to determine the extent of prostate hyperplasia were conducted on 368 elderly patients who were admitted for inguinal hernia surgery (Experimental group) and on 203 other elderly patients who underwent other nonemergency surgeries (Control group) from January of 2010 to December of 2013. The results of IPSS score, the prostate size, and the urine residual volume obtained from the patients of the Experimental group indicated statistically significant differences from those of the Control group. It was concluded that voiding difficulty caused by Benign Prostate Hyperplasia is a significant reason for elderly male patients to develop into inguinal hernia. It is important to have routine prostate examinations required for elderly male patients with the diagnosis of inguinal hernia.

Keywords: Benign Prostate Hyperplasia, Inguinal Hernia, Geriatric Disease

1. Introduction

Both inguinal hernia and Benign Prostate Hyperplasia (BPH) are disorders with a higher frequency among elderly patients [1, 2]. Though there are many patients who are diagnosed with both diseases at the same time, clinicians don't pay attention to their correlation [3]. Some reports of combined transurethral resection of prostate and inguinal hernioplasty for elderly patients were published. However, the scholars still have not stated any cause-effect relationship between BPH and inguinal hernia [4-7]. Othman & Abdel-Maguid (2010) did the research to evaluate the benefit of combined transurethral resection of the prostate and inguinal hernia repair. They mentioned that the prevalence of inguinal hernia and bladder outlet obstruction caused by prostatic disease in adult men increases with age. But they didn't report the relationship between the voiding difficulty caused by BPH and the occurrence of inguinal hernia [8]. According to these result of literature review, we undertook this study to attempt to determine whether BPH is a significant cause factor on formation of inguinal hernia in elderly patients. Three routine preoperative examinations to determine the

extent of prostate hyperplasia were conducted to the elderly patients who were over 60 years old, were diagnosed with inguinal hernia and were admitted to have the inguinal hernia surgery. Same examinations were done to the other elderly patients with some other nonemergency diagnoses to make the comparison. All of the cases were collected from January of 2010 to December of 2013 in our hospital.

2. Materials and Method

2.1. Clinical Information

2.1.1. Experimental Group

The cases collected for the experimental group were the male elderly patients admitted to undergo the inguinal hernia surgery. The patients were required to be more than 60 years old, had no history of chronic bronchitis, no history of recent prolonged coughing for over one month, and no history of chronic intestinal obstruction. Those who were diagnosed with prostate cancer that needed to switch to the urological unit were excluded. Those who had already received the prostate surgery were also excluded. Finally, the

experimental group remained 368 participants who met the above criteria. The age of this group was ranged from 60 to 86 years old; and their average age was 68.6 years old. The length of the course of inguinal hernia ranged from 3 days to 16 years; averagely the length of the course of disease was 5.6 ± 4.8 years. Among them, 267 cases had inguinal oblique hernia at one side, 18 cases within the 267 cases had relapses; 45 cases had inguinal direct hernia, 8 cases within the 45

cases had relapses; 56 cases had inguinal hernias at both sides of the body, 7 cases within the 56 cases had one side with inguinal oblique hernia and the other side with inguinal direct hernia, 38 cases within the 56 cases had inguinal oblique hernias at both sides of the body, 12 cases within the 56 cases had inguinal direct hernias, and 9 cases of the 56 cases had relapses of inguinal hernia on one side (see Table 1).

Table 1. Indices Statistics of inguinal hernia of the Experimental group.

Age (years old)	Number of cases	Course length (years) $\bar{x} \pm s$	Oblique hernia	Direct hernia	Both sides	recurrence
60~	197	5.2 ± 3.7	148	21	28	11
70~	113	5.4 ± 5.1	76	16	21	17
80~	58	8.7 ± 7.6	43	8	7	7
Total	368	5.6 ± 4.8	267	45	56	35

2.1.2. Control Group

The patients of control group were collected from those who needed to undergo other nonemergency surgeries other than inguinal hernia surgery for male elderly patients at the same time period. The patients were required to be over 60 years old, did not come to the hospital for the treatment of BPH, had no history of BPH surgery, and had no history of inguinal hernia or inguinal hernia surgery. At last, there were 203 participants qualified for this control group. The age of this group was ranged from 60 to 85 years old; and their average age was 70.9 years old. 107 of them were between age 60 to 69, 76 of them were between age 70 to 79, and 40 of them were over 80 years old.

2.2. Method

All these patients of experimental group voluntarily received the routine BPH extent examinations of the International Prostate Symptom Score (IPSS), the prostate size by ultrasound and urine residual volume by ultrasound before their surgery operations. The patients of control group were also required to participate in the routine BPH extent examinations voluntarily as our experiment group. Data collection was done by the lab assistants and a statistical analysis was conducted using SPSS-11 software by the hospital librarian.

3. Result

Experimental group: the average IPSS scores, the prostate sizes and the urine residual volume results from the 368 patients in the experimental group were 13.2, 36.6ml and 41.5ml. The details of results were obtained from the patients in different age categories are shown in Table 2.

Control group: the average IPSS scores, the prostate sizes from the ultrasound results and the urine residual volume measurement results from the 203 patients in the experimental group were 9.6, 32.05ml and 37.6ml. The results were obtained from the patients in different age groups are shown in Table 3.

By using the spsss11.5 statistical software, we first conducted Chi Square analysis to compare the IPSS score,

the prostate size and urine residual volume among different age categories in both the experimental group and the control group. The results showed that there was a statistically significant difference between the average results of all the three examinations among three different age categories in each group ($p < 0.01$). Secondly, Chi Square analysis method were used to compare the total average results of the IPSS score, the prostate size and urine residual volume from both groups, the p value was < 0.01 . There was a statistically significant difference between two groups. In addition, we statistically compared examination results between the each same age categories from the experimental group and those from the control group. There was a statistically significant difference between the results from the patients within the same age group ($p < 0.01$).

Table 2. Indices Statistics of benign prostate hyperplasia of the experimental group patients.

Age (years old)	IPSS $\bar{x} \pm s$	Prostate size (ml) $\bar{x} \pm s$	Urine residual volume (ml) $\bar{x} \pm s$
60~	12.2 ± 8.7	35.5 ± 12.2	37.6 ± 28.3
70~	13.6 ± 8.3	37.2 ± 14.3	42.5 ± 32.7
80~	15.8 ± 9.2	39.4 ± 11.8	52.6 ± 38.2
total	13.2 ± 8.5	36.6 ± 12.8	41.5 ± 33.5

Table 3. Indices Statistics of BPH of the Control group patients.

Age (years old)	IPSS $\bar{x} \pm s$	Prostate size (ml) $\bar{x} \pm s$	Urine residual volume (ml) $\bar{x} \pm s$
60~	8.1 ± 6.7	31.48 ± 13.75	34.6 ± 28.3
70~	9.7 ± 8.2	34.2 ± 17.2	36.6 ± 28.3
80~	11.8 ± 9.3	35.26 ± 18.56	40.6 ± 30.2
total	9.6 ± 9.4	32.05 ± 17.53	37.6 ± 28.3

4. Discussion

Inguinal hernia repair is one of the most frequently performed procedures in general surgical practice, with more than 600,000 operations annually in the United States [9]. In China, the incidence of inguinal hernia disease is about 1-5% for male elderly who are over 60 years old; each year, there are about 5,000,000 cases of inguinal hernia formation [10]. It is commonly understood that the reason for male elderly to develop into inguinal hernia is because of the abdominal wall

weakness for elderly. As a person ages, the metabolism of the collagen of the abdominal tissue started changing and the abdominal muscles become thinner due to atrophy. Some other etiology include genetics, smoking, obesity and other reasons that gradually cause the abdominal wall to get weaker and thinner. Increased abdominal pressure due to various causes can also make the abdominal wall thinner; the sudden pressure is the main force to cause the intestine protrusion through the groin [11]. Some factors leading to increased abdominal pressure are chronic bronchitis, chronic coughing, chronic constipation and voiding difficulty caused by BPH. BPH is another common geriatric disease; its main symptom is voiding difficulty. As a person ages, the degree of prostate hyperplasia and the degree of voiding difficulty have also increased. Voiding difficulty can cause increased abdominal pressure during voiding in order to allow the urine to be eliminated. Therefore, it is considered as a matter of course that BPH composes a predisposition to hernia and aggravates hernia symptoms. Though many literatures mentioned that BPH should be a factor of inguinal hernia formation, there has been a lack of actual research study to discuss the relationship between inguinal hernia and BPH [3, 6, 12]. In 1982, Thompson et al. had done a detailed research on 70 cases of patients who needed to undergo inguinal hernia surgery. 47% of the patients in the study had been diagnosed with inguinal hernia formation on admissions or had inguinal hernia surgery in the past; the incidence rate of inguinal hernia formation at that particular time was 20%; their recurrence rate was much higher than the general population. That study was a correlational study, but it didn't mention the cause-effect relationship between BPH and inguinal hernia formation [8].

In this clinical research study, a group of male elderly patients over 60 years old who were admitted to hospital for inguinal hernia surgery were used as experimental group and a group of male elderly patients over 60 years old who were admitted to the hospital for some other nonemergency surgeries as control group. We aimed at doing three preoperative examinations regarding BPH extent and statistically comparing the examination results from the experimental group and those from the control group. These three examinations were IPSS, prostate size by ultrasound and urine residual volume by ultrasound. The statistical analyses revealed that there was a positive relationship between the results from the three examinations and the patient's age ($p < 0.01$) in each group. It meant that the older the patient, the higher the IPSS score, the bigger the prostate size, and the larger the urine residual volume. The results from the statistical analysis showed that the difference had a statistical significance between the total average results of the three examinations of the all the patients in the experimental group and those from all of the patients in the control group ($p < 0.01$). Also there was a statistically significant difference between the results from the patients within the same age categories from the experimental group and those from the control group ($p < 0.01$). The average result obtained from the patients in different age categories of the control group was

consistent with the average results of the whole Chinese population. But the average results obtained from the patients in the experimental group are obviously higher than those from the whole Chinese population ($p < 0.01$) [12]. Therefore, it indicated that among the male elderly population, as the elderly patient's age gets more advanced, the degree of the prostate hyperplasia and the severity of the voiding difficulty are increasing in both the patients with inguinal hernia and the patients with other nonemergency diseases. The extent of the prostate hyperplasia and the severity of the voiding difficulty for male elderly patients who have inguinal hernia are much higher than those for the male elderly patients who have other nonemergency diseases. It revealed that prostate hyperplasia and the severity of the hyperplasia have a significant direct impact on the inguinal hernia formation in male elderly patients.

According to the IPSS score results, the patients with the score less than or equal to 7.0 were experiencing mild symptoms lower urinary voiding difficulty; the patients with the score from 8 to 19 were experiencing moderate symptoms of lower urinary voiding difficulty; and the patients with the score from 20 to 35 were experiencing severe symptoms of lower urinary voiding difficulty. Many patients in our control group experienced symptoms of lower urinary voiding difficulties in various degrees; and the degree of severity of the voiding difficulty is greater when the patient is older. But more patients in the experimental group basically experienced some symptoms of lower urinary voiding difficulties. In the experimental group, half of the patients who were at their 60s experience moderate symptoms of lower urinary voiding difficulties; the severity of voiding difficulty was more serious for the patients who were at their 80s. In the BPH treatment, the quantity of the urine residual apparently reflects the severity of BPH and serves as an important indicator for a pharmacological option or surgical option. Usually, the patient should need a surgery when his urine residual volume was over 60 ml [13]. In this study, we found that the greater the patient's age, the larger the volume of urine residual. According to the results from the experimental group, over 40% of the patients who were at their 80s had met the criteria to undergo prostate removal surgery; about 30% of the patients who were at their 70s met this criteria. However, in the reports from the past literatures, it mentioned that the incidence of inguinal hernia in men who underwent prostate surgery was only 5-12% [14]. The results of this research sufficiently indicated that clinical surgeons have obviously ignored the impact of BPH on inguinal hernia formation in the past. It is suggested to conduct some demographic or epidemical investigation approach among a big population as the literature before showed that few epidemiologic studies of inguinal hernia have been carried out [15].

5. Conclusion

In conclusion, among the male elderly patients who were diagnosed with inguinal hernia formation, it is common for

the patients to experience voiding difficulty as a symptom of BPH. BPH is a significant factor for the patients to develop into inguinal hernia. The routine examinations of IPSS, prostate size and urine residual volume by ultrasound to test the degree of BPH are quite convenient, efficient and economical. It is recommended for the elderly patients who have inguinal hernia to go through these routine examinations in order to determine the corresponding treatment options: medicine only, single surgery of inguinal hernia repair, or combined TURP and inguinal hernia repair. It has quite a clinical significance to inguinal hernia recurrence prevention, early diagnosis and intervention of voiding difficulty due to BPH, alleviation of the patient's suffering and the saving of the medical resources.

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