

Deep Ring Occlusion Test and Its Relevance in the Clinical Evaluation of Inguinal Hernias - A Prospective Analysis

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ABSTRACT

BACKGROUND

Inguinal hernias are one of the most common problems dealt by general surgeons and is the most common clinical entity evaluated by medical graduates. Deep ring occlusion test remains one important and most emphasized clinical test while discussing about inguinal hernia. This test helps in differentiating between direct and indirect inguinal hernia. The treatment is same in all types of hernia that is tension free mesh repair by open or laparoscopic repairs.

METHODS

In this prospective study we evaluated 252 cases of unilateral hernias with deep ring occlusion test, systematically correlated per operatively, and with reference to internal ring diameter. Quantitative data was analysed using sensitivity, specificity & appropriate statistical test of significance and presented.

RESULTS

Using deep ring occlusion test as the clinical test to differentiate between the direct and indirect inguinal hernias, 89 cases (35.3%) were indirect and 163 (64.68) were direct hernia. The per-operative findings showed 101 cases of direct hernias and 151 cases of indirect hernias accounting for 40.07% and 59.97% respectively. The sensitivity of the test still remains high (100%) but the specificity is only 59.1% and the positive predictive value 75.40%. In direct hernias, the sensitivity is 100% and specificity is 50%; the positive predictive value is only 61.96%. The overall accuracy of the test in diagnosing direct hernias is 72.44%. In indirect hernias the sensitivity is only 70.89%, the specificity is 100% and the positive predictive value is 100%. The overall accuracy of the test in diagnosing direct hernias was only 79.47%

CONCLUSIONS

Deep ring occlusion test can be used as a supportive test to distinguish between direct and indirect hernias and multiple factors play a role in reducing the specificity, accuracy and positive predictive value of the test. Study points to the fact that it is a non-specific confirmatory test that helps in clinically differentiating direct and indirect hernias and its over emphasis in clinical evaluation method is unwarranted.

KEY WORDS

Deep Ring Occlusion Test, Inguinal Hernia, Internal Ring Diameter

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BACKGROUND

Inguinal hernia is the commonest type of groin hernia constituting 75% of adult hernias and they account for most common general surgical operations worldwide accounting for about 10 – 15% of all surgical procedures preceded only by appendectomy.^[1] The estimated annual incidence of inguinal hernias In India, is 1,957,850.^[2] It is also one of the most common clinical evaluation case given to clinical evaluation of Undergraduates and Post graduates.

The two types of inguinal hernia are the direct and indirect type differentiated by the position of the hernia sac in relation to the deep ring. Clinically the two types are differentiated by various clinical tests of which deep ring occlusion test remains one important and most emphasized clinical test while discussing about inguinal hernia. This test forms the main pillar test in differentiating between direct and indirect inguinal hernia clinically along with the Invagination test and Zeeman's test. In the present-day context, too much emphasis is laid on this test to differentiate between two types of inguinal hernia. This is becoming irrelevant as the treatment's strategy for both direct and indirect hernia remains the same by tension free mesh repair.^[3] Deep ring occlusion test still remains a clinical evaluation test in undergraduate examinations even though treatment remains the same.

The clinical textbooks and various examinations rely much on this single clinical test to differentiate between the two. There are reports regarding the lack of specificity of this digital control of inguinal ring pre-operatively to be incorrect as often as correct. This study correlates the pre-operative findings of deep ring occlusion test in groin hernia patients to the post-operative findings and statistically assess the sensitivity and specificity of this single test.

METHODS

The prospective study was conducted in the Department of General Surgery, Government Medical College, Thrissur of 252 adult inguinal hernia patients admitted and operated in our unit for last 4 years 2017 to December 2019. All the paediatric and complicated hernias were excluded from the study. All emergency surgical interventions of hernias were also excluded from the study.

In all cases we studied, a pattern of steps was followed, so that no disparity would arise in examination of patients. From each patient after a detailed clinical history the Deep Ring Occlusion test was performed by 2 Members in the unit and the findings were finalized which was done as follows-

- Patient is asked to stand.
- The hernia is reduced completely.
- Palpate the Anterior Superior iliac spine and the symphysis pubis. Take the mid-point of the line joining these 2 bony points and mark a point ½ inch above this point, with a surface marker. This point corresponds to the deep inguinal ring and is marked

- Apply pressure with the thumb on the marked point to occlude the deep inguinal ring and patient is asked to cough.
- Observation is made as to whether a bulge appears medial to the occluding finger, which is a negative result (in case of direct hernia) or no bulge appears which is positive result (in case of indirect hernia).
- Interpretations were recorded as Direct and Indirect hernias.

Patients were operated and the operative type of hernia are entered and in each case the diameter of internal ring was measured using a suture thread, measured and entered into the data sheet.

Data collected from every patient were entered to excel worksheet after coding of variables & appropriate analysis was done with help of EPI- INFO and Qualitative data was analysed. Quantitative data was analysed using mean, sensitivity, specificity and appropriate statistical test of significance and presented.

RESULTS

In our study of 252 cases, most of the hernia cases were in the age group between 40-60 years constituting 52.8% (figure 1) and were mostly males 240:12 and no significant predisposition to sides, with 109 Left sided and 143 right sided hernias (Table 1) (Fig. 1)

Using deep ring occlusion test as clinical test to differentiate between the direct and indirect inguinal hernias 89 cases (35.3%) were indirect and 163(64.68) cases were direct hernia.

All the patients were operated and the findings were recorded on the finding of direct and indirect hernias .The per-operative findings of the above 252 cases were as follows. There were 101 cases of direct hernias and 151 cases of indirect hernias accounting for 40.07% and 59.97% respectively, thus showing a remarkable disparity between the clinical and pre-operative findings of direct and indirect hernias. Table 2 Fig. 2.

Whatever be the type of hernia, the majority of the patients (96.05%) underwent Lichen Stein tension free hernioplasty, 2.3% TEP repairs and herniotomy alone in 1.7% of patients. Herniotomy was performed mainly in young adults of the age group 12-20 years with strong abdominal walls and indirect hernial sac.

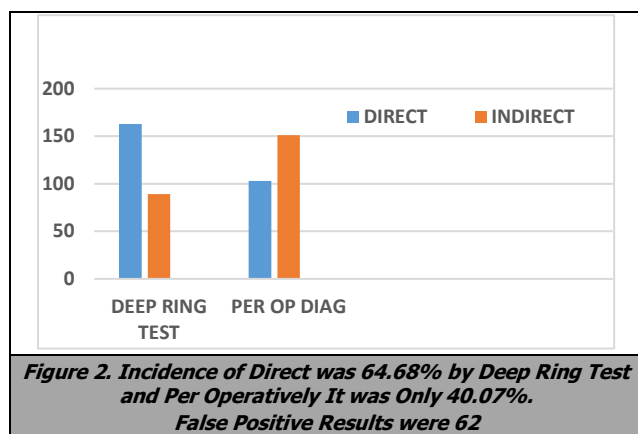
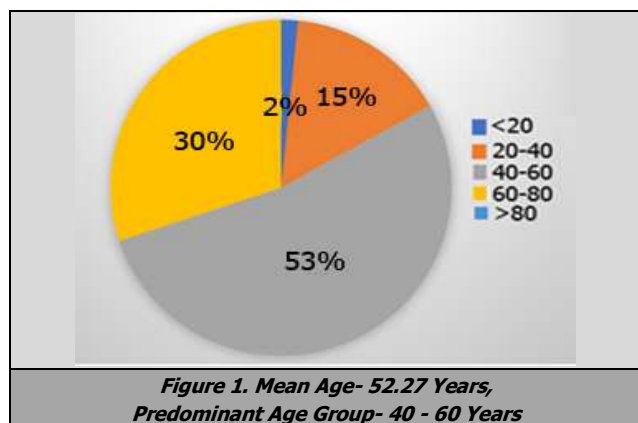
The statistical significance of the Deep ring occlusion test to differentiate between the two types of inguinal hernia, in preoperatively were analysed and it was found that by using Deep ring occlusion test as the clinical test there were 190 true positives and 62 false positivity. The sensitivity of the test still remains high (100%) but the specificity is only 59.1 % and the positive predictive value 75.40%.

When independently analysed the statistical significance of the test in each Type of hernia it was found that in direct hernias the sensitivity is 100% and poorly specific with 50% and the positive predictive value of only 61.96%. The overall accuracy of the test in diagnosing direct hernias are 72.44%.

Similarly, in indirect hernias the sensitivity is only 70.89% and specificity of 100% and the positive predictive value of only 100%. The overall accuracy of the test in diagnosing direct hernias was only 79.47%. [Table 3a, b, c]

For a clinical test used to differentiate between two entities the most important parameter is specificity and high positive predictive value which is lacking in this clinical test

To analyse the reasons for the misdiagnosis, we assessed the diameter of internal ring and the results were statistically analysed. The mean internal ring diameter was 1.48 cms. in all cases. Mean internal ring diameter of deep ring in the False positive cases were 1.94 cm and mean diameter in the true positives was 1.28 cms. showing that the results correlated with clinical test results. This conveys to the fact that as the diameter of .the internal ring increased the sensitivity of the test reduces.



Age Mean 52.2 years		
< 20	41	1.58%
20-40	38	15.07%
40-60	132	52.38%
60-80	75	29.76%
> 80	3	1.1%
Sex - M : F (20 : 1)		
Male	240	86.90%
Female	12	13.09%
Side		
Left	109	43.2%
Right	143	56.7%

Table 1. Age, Sex & Gender Distribution

	DRT-%	Direct Hernia-%	Indirect-%
Sensitivity	100 (CI 98.08 - 100)	100 (96.4 - 100)	70.89
Specificity	59.4 (40.8 - 50.9)	50 (40.8 - 54.11)	100
Positive Predictive	75.4 (71.9 - 78.51)	61.96 (56.7 - 66.02)	100
Accuracy	80.25	72.44	79.44

Table 2. Tests of Significance of Deep Ring Occlusion Test

DISCUSSION

In this study we found that inguinal hernia affected mostly men with a mean age of 52.47 ± 22.87 mostly in the 40–60 years and most studies have found higher incidence of inguinal hernia in higher age groups.[4] The mean age of presentation was comparative with other studies in literature. Literature suggests that inguinal hernias are more common in males than in females (20:1).[5] In our study also, we found that there were more males with inguinal hernias than females. There were more hernias on the right side compared to left side, but no significant reasons were responsible for the difference.

Clinical test to differentiate between the two types of inguinal hernias were Deep ring occlusion test[6] and Ziemann test based on the anatomical factors of the Inguinal canal. Internal ring is a defect in the transversalis fascia, and it lies 1.25 cm above the inguinal ligament midway between anterior superior iliac spine and symphysis pubis. The internal ring occlusion test will block the indirect inguinal sac which comes out through the internal ring using the thumb.

Using deep ring occlusion test as clinical test to differentiate between the direct and indirect inguinal hernias 89 cases were indirect and 163 cases were direct hernia. All the patients were operated and the findings were recorded on the finding of direct and indirect hernias. The per-operative findings of the above 252 cases were as follows. There were 101 cases of direct hernias and 151 cases of indirect hernias. The accounting for 40.07% and 59.9% respectively, thus showing a remarkable disparity between the clinical and pre-operative findings of direct and indirect hernias.

The statistical significance of the Deep ring occlusion test to differentiate between the two types of inguinal hernia, in preoperatively analysed and it was found that by using Deep ring occlusion test as the clinical test there were 190 true positives and 62 false positivity. The sensitivity of the test remains high (100%). But the specificity is only 59.1 % and the positive predictive value 75.40 %.

This study showed the lack of specificity of internal ring occlusion test (59.1%) which shows that this test cannot be used as a fool proof clinical test to distinguish between direct and indirect hernia. This test has also got a low positive predictive value of 75.40%.

The overall results reflects that the test lacks accuracy, specificity and positive predictive value questioning it's over reliance in clinical evaluation and assessment of surgical trainees and undergraduates. Western clinical books do not over emphasize its importance because the test may be negative even in indirect inguinal hernias due to long standing indirect hernia produced widening of the internal ring and also misinterpretation of the test.[7] The main classification systems of hernia by Nyhus is also based on the diameter of internal ring.

The reasons for lack of specificity are false localization of the internal ring, widening of internal ring in long standing indirect inguinal hernias and small direct inguinal hernias which are occluded by the examining finger. The mean internal ring diameter was 1.48 cms in all cases. But average

internal ring diameter of deep ring in the False positive cases were 1.94 cm and average diameter in the true positives was 1.28 cms showing that the results correlated with clinical test results. The mean diameter of the deep ring in various studies ranged between 13 mm and smallest diameter is 9 mm in cadaveric dissections.^[8,9] The test can become false positive due to many factors. The diameter of internal ring is a key factor along with the accurate placement of the occluding finger can influence the test results. Whatever be the type of hernia, the majority of the patients (96.05%) underwent Lichen Stein tension free hernioplasty, TEP repairs in 2.7% and Herniotomy alone in 1.3%.

The literature suggests that the best repairs are not based on the type of hernia and basic principle of all repairs is by strengthening of the posterior wall by an artificial mesh either open or laparoscopic methods.^[10,11,12] The Laparoscopic repairs of Trans abdominal pre peritoneal repair and TEP also uses the same principle in dealing with the hernias. So the type of hernia is not a factor that determines the choice of repair. The choice of repair is influenced mainly by the patient's choice and surgeon's expertise in this modern Era.

We feel that over reliance on the Deep ring occlusion test is unwarranted as seen from the findings above that test can be used as a supportive test to distinguish between direct and indirect hernias but not as a fool proof clinical test.

CONCLUSIONS

Inguinal hernias are the most common clinical problems encountered in the present day surgical practice. Deep ring occlusion test can be used as a supportive test to distinguish between direct and indirect hernias and multiple factors play a role in reducing the specificity, accuracy and positive predictive value of the test. Study points to the fact that it is a non-specific confirmatory test that helps in clinically differentiating direct and indirect hernias and its over emphasis in clinical evaluation method is unwarranted.

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