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Original Research Article

A comparative study of outcomes of Lichtenstein repair and Desarda tissue repair in patients of inguinal hernia

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ABSTRACT

Background: Inguinal hernia is a very common surgical problem for which, mesh-based techniques, particularly the Lichtenstein repair is considered standard. However, problems like foreign body sensation, wound infection, cord fibrosis, chronic pain and recurrence are major concern. Desarda tissue repair (non-mesh technique), which was given by an Indian surgeon, is now being used in many countries because of low cost of procedure with very low recurrence rates. The objective of this study was to evaluate the feasibility of Desarda tissue repair at a tertiary care centre of Central India as a treatment of primary inguinal hernia, by comparing it with Lichtenstein repair in terms of various post-operative parameters.
Methods: Patients between age of 18 and 70 years with primary inguinal hernia were included in this randomised controlled trial. Patients with strangulated, obstructed or recurrent hernia, surgically unfit patients and patients having unmanaged urinary obstruction, cough or constipation were excluded. Randomization was done by sealed envelope method into Lichtenstein and Desarda arm and respective surgeries were performed.
Results: 90 patients were included in the study and average duration of follow-up was 15.1 months. Operative time was significantly less in Desarda arm (14.75 min compared to 21.32 min in Lichtenstein arm). Cost, incidence of seroma formation, post-operative pain, foreign body sensation and chronic pain were also significantly less in Desarda arm. No recurrence was observed in both arms.
Conclusions: Desarda repair is easy to perform and takes less time to perform and proves cost effective. Desarda repair is comparable to Lichtenstein repair in terms of many parameters and superior in terms of post-operative pain and foreign body sensation and can be preferred for young patients. In infected and strangulated cases, Desarda repair can be used effectively without fear of mesh infection.

Keywords: Chronic pain, Desarda tissue repair, Inguinal hernia, Lichtenstein repair, Recurrence

INTRODUCTION

A hernia is a protrusion of a viscus or part of a viscus through an abnormal opening in the wall of its containing cavity.[1] Hernias occur at various sites of the body, but most of the hernias occur at anterior abdominal wall, particularly the inguinal region. An inguinal hernia or hernia inguinalis is a protrusion of the content of the abdominal cavity or pre-peritoneal fat through a defect in the inguinal area, irrespective of whether this is performed.[2] Most of the patients of hernia present with pain or discomfort and groin swelling especially when intra-abdominal pressure increases while coughing, exercise, or bowel movements. Pain gets worse throughout the day and improves when lying down.[3]

Mesh-based techniques, particularly the Lichtenstein technique and laparoscopic methods were recommended

for treatment of symptomatic inguinal hernia in adult by European Hernia Society.[2] Lichtenstein technique is currently most popular method among different open mesh techniques with minimal perioperative morbidity. It is considered standard of care in patients of inguinal hernia. However, problems like foreign body sensation, wound infection, cord fibrosis, chronic pain and recurrence (2%) are major concern. Greater majority of hernia operations in the developing world, India inclusive, are done by non-specialists such as medical officers, medical-assistants (Clinical Officers) and paramedics. This all may lead to increased incidence of complications and recurrence.

Dr. Mohan P. Desarda reported a novel technique of a tissue-based hernia repair with very less recurrence. Desarda repair is based on concept of providing strong, mobile and physiologically dynamic posterior inguinal wall without use of any prosthesis. Here in place of mesh, an undetached strip of external oblique aponeurosis is stitched to posterior wall to strengthen it. The technique requires less complicated dissection or suturing, no mesh is needed, easy to learn and has results similar if not better than Lichtenstein repair.[4]

In study centre, Lichtenstein repair is done while in cases of strangulation, Bassini's repair is performed commonly. The aim of this randomized control trial is to compare the clinical outcomes of the standard mesh-based Lichtenstein repair with the Desarda tissue repair for the treatment of primary inguinal hernia among Indian people.

The aim of this study is to evaluate the feasibility of Desarda tissue repair at a tertiary Hospital as treatment of primary inguinal hernia, by comparing it with Lichtenstein repair during study period of one year in terms of operative time, cost of surgery, post-operative pain, wound infection, seroma formation, return to normal activity, cord induration, local hypoesthesia/paraesthesia, chronic pain, foreign body sensation and early recurrence.

METHODS

This study was a randomised controlled trial. It was carried out in the PG department of Surgery, SRN Hospital, affiliated to MLN Medical College, Allahabad, from September 2015 to April 2017 after approval from the Ethics Committee and obtaining written and informed consent from the patients.

All male patients between 18 years and 70 years of age, who were admitted from September 2015 to August 2016 for primary unilateral or bilateral inguinal hernia were included in the study. Obese patients (BMI > 30), patients with strangulated or obstructed hernia, recurrent hernia, medically unfit patients, patients suffering from serious life threatening medical illness, or untreated urinary obstruction, cough or constipation and patients who were lost during follow-up were excluded from the study.

Randomization was done by Lottery system. Small cards having 'D' or 'L' written on them were sealed in non-transparent envelopes which were then picked up by the patients. D and L were planned to be operated by Desarda repair and Lichtenstein repair respectively. In bilateral cases, envelopes were picked for Right side and on the left side, other procedure was performed.

Patients were kept NPO for 6 hours. Hair clipping was done and single shot Inj. Amoxycillin clavulanate 1.2 gm was given as pre-op antibiotic. All surgeries were performed under spinal anaesthesia.

Herniotomy

The incision of 7-10 cm was given on groin skin crease starting 2 cm above and medial to pubic tubercle and parallel to inguinal ligament. After dissecting subcutaneous tissue and fascia, external oblique aponeurosis (EOA) was exposed. After achieving hemostasis, EOA was incised along direction of fibres starting at superficial ring to 2 cm lateral to deep ring. Precautions were taken to avoid injuries to ileoinguinal and ileohypogastric nerves. Spermatic cord was mobilized at level of pubic tubercle and separated from inguinal ligament and Cremastric fibres were divided. Vas deferens was identified as white glistening cord like structure.

Hernial sac was identified and dissected free from cord and cleared up to the level of deep ring. The sac was then twisted, transfixed and ligated with atraumatic vicryl 2-0. Excess sac was excised 1 cm distal to ligature and complete hemostasis was achieved before dropping the sac back into the deep ring. Sac of small direct hernia was invaginated back. Very large sac was opened by scissors at fundus and contents were reduced and part of sac adhered to tunica is left in situ. For sliding hernias, cut edges of peritoneum were repaired by Vicryl 2-0 round body in continuous fashion.

After completion of herniotomy, repair of posterior wall was done by either Lichtenstein or Desarda technique. Calculation of operative time was started when any of the technique between Desarda and Lichtenstein repair was initiated and closure of skin was taken as end point.

Desarda repair

Upper leaf of external oblique aponeurosis was sutured to inguinal ligament from pubic tubercle to the deep ring using 2-0 prolene round body in continuous fashion. First 1-2 sutures were taken in anterior rectus sheath. Last suture was taken so as to narrow the deep ring sufficiently without constricting spermatic cord.

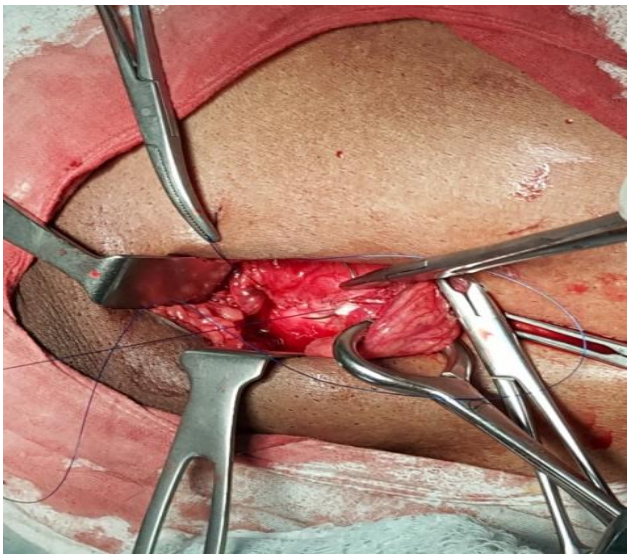

Figure 1: Intraoperative photograph of Desarda tissue repair.

A splitting incision was made in upper leaf and a strip of 1.5-2 cm was separated. Incision was extended medially up to rectus sheath and laterally 1-2 cm beyond deep ring. Free border of the strip was then sutured to internal oblique or muscle arch with 2-0 prolene round body in continuous fashion throughout its length. Then patient was asked to cough and increase in tension in strip was confirmed. Spermatic cord was then placed in the newly formed inguinal canal. Then lower leaf of EOA was sutured to newly formed upper leaf of EOA in front of cord by 2-0 prolene in continuous fashion. Skin was then closed by nylon and dressing was applied.

Lichtenstein's mesh repair

After herniotomy, cord was drawn away. Monofilament standard prolene mesh of 6×11 cm was fashioned to fit into inguinal canal. Then mesh was fixed to posterior wall by taking first sutures 1 cm medial to public tubercle. A longitudinal slit was made in lateral aspect of mesh between upper 2/3rd and lower 1/3rd and mesh was placed in such way that spermatic cord came between the two tails of mesh. Cord was lateralized and inferior edge was stitched to inguinal ligament in continuous fashion. Upper edge of mesh was secured by prolene 2-0 round body in interrupted fashion by taking bites into internal oblique aponeurosis or muscle two tails were sutured around the cord and new deep ring was made. The cord was then allowed to fall back on posterior wall. EOA was closed by continuous vicryl 2-0 round body and superficial ring was constricted to fit the cord snugly. Skin was closed by Nylon and dressing was applied.

Follow-up

Patients were prescribed IV fluids and IV aqueous dynapar 8 hourly on same day. Patients were allowed oral feeds 8 hours later and shifted from parenteral to oral analgesics SOS. Pain measurement on Visual Analogue Scale and Check-dress with evaluation of stitch line was done on 2nd day and was evaluated for any seroma or hematoma formation or wound infection. Patients were discharged on 2nd to 3rd day when able to walk comfortably. In case of wound infection, period of admission was lengthened for treatment. Patients were viewed after 1 week at that time skin sutures were removed and follow up data was recorded. Further follow up was done on patient's visit or by phone call till April 2017.

Preoperative variables like age, BMI, occupation, addiction, associated illnesses, chief complaints, location of hernia, type of hernia, reducibility, any acute presentation, associated scrotal swelling, intraoperative variables like method of repair, local wound condition, adhesions, intraoperative complications (injury to vas, nerves or vessels) were recorded.

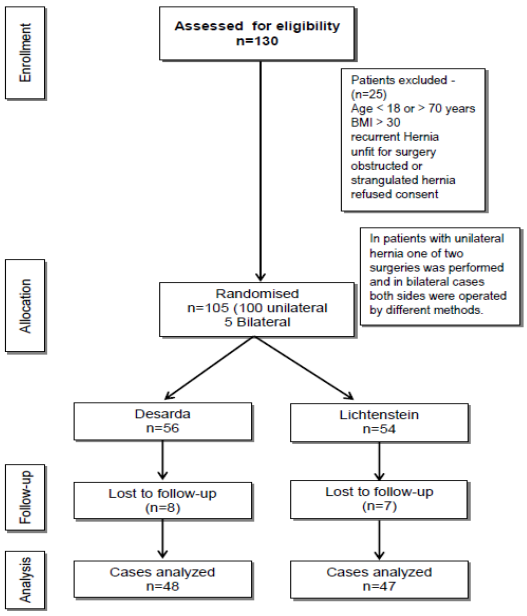

Figure 2: Outline of the trial.

Outcome variables like operative time, cost of surgery, post-operative complications like wound infection, seroma, scrotal swelling, fever etc., post-operative pain score on visual analogue scale (time points were 2nd day, at 1 week at 1 month and at 3 months), time to return to normal activity in days, cord induration, local neurological deficit, foreign body sensation, chronic pain and recurrence were recorded.

Data was collected and entered into Microsoft Excel sheet and then exported into SPSS data system for analysis. The baseline information was presented in tables. Categorical variables were reported as numbers and proportions. For continuous variables, mean and standard deviation were calculated. Comparisons of

dichotomous outcomes was performed by $\chi 2$ (chi-square) test. Continuous data was compared using an unpaired t test. $P < 0{\cdot}05$ (two sided) was considered statistically significant.

RESULTS

130 patients were included in the study, from which 25 patients were excluded during screening. 56 Desarda repair and 54 Lichtenstein repairs were done on 105 patients. All patients were followed up during post-operative period, and after discharge they were followed up by regular visits or by telephone contact till April 2017. 15 patients were lost during follow-up, 8 from Desarda group and 7 from Lichtenstein group. Total 90 patients (85 unilateral, 5 bilateral) were observed and data was analysed. In 90 patients, 85 were unilateral cases and 5 were bilateral. 48 Desarda repair and 47 Lichtenstein repairs was done on these 90 patients.

Table 1: Baseline preoperative characteristics in both arms.

Characteristics	Desarda arm	Lichtenstein arm
Age (in years)	45.1	44.9
Complaint		
Pain	5 (10.5%)	8 (17%)
Swelling	5 (10.5%)	4 (8.5%)
Pain and swelling	38 (79%)	35 (74.5%)
Occupation		
Heavy duties	20 (41.7%)	21 (44.7%)
Moderate	17 (35.3%)	15 (32%)
Light duties	11 (23%)	11 (23.3%)
Co-morbidities		
BPH	2 (4.2%)	2 (4.3%)
Stricture	1 (2%)	2 (4.3%)
Tuberculosis	2 (4.2%)	1 (2.1%)
COPD	1 (2%)	1 (2.1%)
Constipation	2 (4.2%)	3 (6.4%)
Diabetes Mellitus	3 (6.2%)	5 (10.6%)
Addiction		
Smoker	19 (39.6%)	16 (34%)
Alcoholic	18 (37.5%)	15 (32%)
Tobacco chewers	30 (62.5%)	27 (57.5%)
BMI		
Underweight	3 (6.3%)	2 (4.3%)
Average	23 (47.9%)	15 (31.9%)
Overweight	22 (45.8%)	30 (63.8%)

Patients randomized into Desarda and Lichtenstein groups had similar characteristics. Operative time was 14.6 min in Desarda group and 20.3 min in Lichtenstein group which was statistically significant. The difference in operative time was attributed to continuous suturing done in Desarda repair.

Cost of surgery is very less in Desarda repair in comparison of cost of Lichtenstein repair. In Lichtenstein repair, prolene mesh is used which costed 1764 Rs. while in Desarda repair, mesh was not used.

Table 2: Intraoperative characteristics in both arms.

Characteristics	Desarda arm	Lichtenstein arm
Site		
Right	36 (75%)	32 (68.1%)
Left	12 (15%)	15 (31.9%)
Type		
Direct	10 (20.8%)	4 (8.5%)
Indirect	38 (79.2%)	43 (91.5%)
Reducibility		
Reducible	45 (93.75%)	45 (95.7%)
Irreducible	3 (6.25%)	2 (4.3%)
Content of Hernial sac		
Omentum	27 (56.3%)	28 (59.6%)
Bowel	12 (25%)	11 (23.4%)
Omentum and bowel both	8 (16.7%)	7 (14.9%)
Urinary bladder	0 (0%)	1 (2.1%)
Lipoma of cord with omentum	1 (2%)	0 (0%)
Wound		
Normal	46 (95.8%)	45 (95.7%)
Scar	1 (2.1%)	1 (2.15%)
Minor Infection	1 (2.1%)	1 (2.15%)
Adhesions	14 (29%)	11 (23.4%)
Associated scrotal swelling	7 (14.6%)	5 (10.6%)

There was no statistical difference found in regard to post-operative complications like fever, urinary retention and wound infection, etc.

Pain was scored on a visual analogue scale of 0 to 10. In present study, patients in Desarda group complained of less pain on 2nd day and pain at 1 week. In Lichtenstein group, post-operative pain on 2nd day was between 2 and 5 on visual analog scale (average VAS score = 3.51). It was between 1 and 3 on 1st week (average VAS = 1.91). In Desarda group, pain on 2nd day was between 2 and 5 (average VAS = 2.90). On 1st week, it was between 1 and 3 (VAS 1.37). It was found statistically significant. However, difference in average pain at 1 month was not significant. Also, the number of patients who complained of pain was also found insignificant. At 1 month, 9 patients complained of continuous pain (VAS between 1 and 2) obviating to take analgesics in Lichtenstein armand 5 patients complained of pain (VAS between1to 2) in Desarda arm. This observation of less intensity of pain score possibly confirms that the Desarda repair, as acclaimed by its inventor and others, is indeed a tension-free tissue repair.

Incidence of chronic pain was 2.3% in Desarda group and 16% in Lichtenstein group. The difference was large but found statistically not significant. 3-month duration was

taken to define chronicity. In present study, no patient developed foreign body sensation in Desarda group while 37.5% patients complained of foreign body sensation in Lichtenstein group. The absence of severe adverse events in this study demonstrates that both Desarda and Lichtenstein methods can safely be employed. In present study, no recurrence was observed in any of the group.

Table 3: Outcome variables in both arms.

Characteristics	Desarda arm	Lichtenstein arm	p-value
Operative time (in min.)	14.75	21.32	<0.05
Cost of surgery (in rupees)	990	4424	<0.05
No. of patients having Fever	1 (2.1%)	2 (4.26%)	0.9852
No. of patients having Urinary retention	2 (4.2%)	7 (14.9%)	0.1514
No. of patients having seroma	4 (4.3%)	12 (25.5%)	<0.05
No. of patients having wound infection	3 (6.25%)	5 (10.6%)	0.6887
Post-operative pain (average VAS)			
Pain on 2nd day	2.90	3.51	<0.05
Pain at 1 week	1.37	1.91	<0.05
Pain at 1 month	20.17	0.36	0.1588
No. of patients having pain at 1 month	5 (10.4%)	9 (19.15%)	0.3623
Return to normal activity (in days)	19.16	19.6	0.417
Incidence of cord induration	3 (6.25%)	9 (19.15%)	0.1134
Incidence of local hypoesthesia	10 (20.8%)	7 (14.9%)	0.6259
Incidence of foreign body sensation	0 (0%)	18 (38.3%)	<0.0001
Incidence of chronic pain	1 (0%)	7 (13.95%)	0.0588
Recurrence	0 (0%)	0 (0%)	-

DISCUSSION

The gold standard for hernia repair is considered to be Lichtenstein repair, which is a type of hernioplasty, using mesh. However, mesh has its own drawbacks. It increases the cost of the operation and is not available universally especially in the developing world. Mesh prosthesis is well known to shrink by 20-35% of its size, in vivo. As the groin is a mobile area there is a tendency for the mesh to fold, wrinkle or curl. The slightest movement of the mesh from the sutured area leads to failure of mesh repair of inguinal hernias.[5]

Lichtenstein repair is claimed to have the least recurrence (<2%) but Liem MS et al, recorded recurrence rates of 6.3% at 2 years and 10.0% at 4 years.[6] Shin D et al conducted urologic evaluation of patients suffering from infertility who were operated in the past by mesh repair.[7] He found unilateral or bilateral vasal obstruction with testicular atrophy or epididymal obstruction as a cause of infertility. Surgical exploration revealed a dense fibroblastic response encompassing the polypropylene mesh with either trapped or obliterated vas, in all patients. The authors concluded that the mesh repair, especially in young reproductive age or with a solitary testicle, needs to be carefully advised regarding potential obstruction and compromise of future fertility.

Robinson TN et al collected 252 adverse event reports including infection (42%), mechanical failure (18%), pain (9%), reaction (8%), intestinal complications (7%), adhesions (6%), seroma (4%), erosion (2%), and other (4%).[8] Compared to all other mesh types, Sepra/polypropylene mesh had more mechanical failures, while biomaterial mesh had more reactions. PTFE/polypropylene mesh had more intestinal complications while PTFE mesh had more infections.

Tension-free mesh hernioplasty can lead to chronic groin sepsis, the treatment of which is surgical removal of mesh.[9] Few very rare complications are also reported as a consequence of mesh repair including necrotising fasciitis, orchialgia, colo-cutaneous fistula.[10-12]

Dr. Desarda MP, described his own novel technique of hernia repair without using a mesh. In his surgery, a strip of external oblique aponeurosis is partly separated from its medial leaf, keeping its continuity intact at either end. This is sutured to the inguinal ligament below, and the arch of the muscle above, behind the cord, to form a new posterior wall. Contraction of the external oblique muscle creates lateral tension in this strip while contraction of the internal oblique/conjoined muscle creates tension upwards and laterally, making the strip a shield to prevent any herniation. So additional strength given by the external oblique muscle to the weakened conjoined tendon to create tension in the strip and prevent re-

herniation is the essence of this operation. Tension created in this strip is graded. Stronger intra-abdominal blows result in stronger abdominal muscle contractions leading to increased tension in this strip to give graded protection. At rest the strip is without any tension. Thus, a strong and physiologically dynamic posterior wall is created. The aging process is minimum in the tendons and aponeurosis, so a strip of the external oblique, which is tendo-aponeurotic, is the best alternative to the mesh.[13] He claimed his method to be simple and an effective method of surgical correction of this pathology leading to early ambulation, less hospital stays, early return to normal activities, with no recurrence and less complication rates.[14,15]

As the method is based on different principles, it also faced criticism. Losanoff JE and Millis JM objected for incomplete and unreliable method of follow-up done by Dr. Desarda.[16] They claimed Desarda hernia repair was not superior to mesh repair and also claimed this method to be a mere modification of previous non-mesh repairs.

Naguib N, objected to Desarda repair, as longer periods of follow-up were not used.[17] Claims of the Desarda technique being tension-free was questioned, as contraction of the muscles makes tension on the aponeurotic strip and Suturing the edge of the upper flap to the posterior wall does not strengthen the posterior wall muscles. Claiming the method physiological was objected as it disturbs the physiology of the abdominal wall muscles by suturing them together as the muscles run in different directions.

In the present study, there was no statistically significant difference between the Desarda and Lichtenstein methods in regard to postoperative complications, time to resumption of normal activity, induration of cord, local hypoesthesia and recurrence. However, a significant difference with regard to operative time, post-operative pain and foreign body sensation was observed in this study ($P<0.05$).

The operative time in the present study was taken as the duration of actual repair technique, from the end of herniotomy (ligation of the sac) to the time of placement of the last stitch of repair (before closure of external oblique aponeurosis is embarked on). Operative time was 14.75 min in Desarda group and 21.32 min in Lichtenstein group which was statistically significant. The difference in operative time was attributed to continuous suturing done in Desarda repair. Less operative time in Desarda group was attributed to less need of traction as was also seen by Manyilirah et al, who obtained similar results.[18] Youssef T et al, also found operative time significantly less (59.4±6.3 min) compared to Lichtenstein (72±12.2 min).[19] In this study, operative time was taken from start of skin incision to closure of skin. Abbas Z et al, found the operative time similar in both types of surgery.[20] The author applied interrupted sutures while stitching the strip of aponeurosis to posterior wall in his study which can be attributed to prolonged operative time.

Seromas may result from extensive tissue dissection and by the influence of the synthetic mesh on surrounding tissues. There was less incidence of seroma formation in Desarda group in present study (8.33% in Desarda compared to 25.53% in Lichtenstein group) which was found statistically significant. Abbas Z et al, reported rate of seroma formation rate 0% in Desarda and 1.4% in Lichtenstein repair.[20]

There is documented evidence that shows decrease in male sexual function if mesh repair is done.[21] Also, extensive fibrosis after mesh implantation leads to nerve entrapment and chronic pain.[22] So the surgeons should prefer tissue based techniques when dealing with a young patient. The absence of severe adverse events in this study demonstrates that both Desarda and Lichtenstein methods can safely be employed in day care surgery.

In present study, no recurrence was observed in any of the group. Although longer periods of follow-up may be required to properly assess tissue repair procedures, but initial results comparable to Lichtenstein method look promising.

CONCLUSION

Desarda repair is easy to perform and has shown to take shorter operative time. Also, there is no need of mesh with less suture material requirement. So, this method proves cost effective than the Lichtenstein method. Desarda hernia repair was found to be superior to Lichtenstein repair in terms of post-operative pain and foreign body sensation. It can be recommended for younger patients. This study has shown that the efficacy of Desarda repair in respect to influencing long term outcomes in patients is comparable to Lichtenstein repair. So, it can be safely used as an alternative to conventional method. In infected and strangulated cases, Desarda repair can be used effectively, as risk of mesh infection is eliminated. Also, this technique can eliminate the fear of mesh infection in diabetic patients.

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Ethical approval: The study was approved by the institutional ethics committee

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