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Efficacy of Vacuum Assisted Closure versus Offloading Technique in Healing Of Foot Ulcers

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Abstract

Objective -A foot ulcer is caused by trauma to the foot in combination with nerve damage and blood circulation.The study was indented to explore the efficacy of vacuum assisted closure and offloading technique in healing of foot ulcers.

Methodology - vacuum system comprising of vacuum pump, canister, tubing to connect dressing with pump ,dressing pack (foam and occlusive drapes like opsite) with the VAC therapy setting (usually 125 mm hg continuously or intermittently 30 min on/15 min off) was used. Statistical analysis was done using the SPSS version 20 software and results were generated.

Results-Out of 122 patients, 70 patients were allotted for VAC and 52 patients were allotted for offloading technique. Sloughed out wound were debrided for initial period. Then VAC and TCC were allotted to the patients. PUSH scoring was assessed at the time of admission and during the change of dressings in each method and plotted in a graph. Wound size was measured with the use of ECG paper. PUSH score was determined by wound size, exudate amount and granulation tissue. Then wound surface area and percentage of reduction in the wound surface area was calculated respectively. Also the duration of the hospital stay was also recorded.

Conclusion -Both study groups has a mean difference of age which is insignificant and the study is comparable. Also the null hypothesis is retained on the admission in both study groups.

Keywords: PUSH scoring, wound surface, offloading technique, VAC

Introduction

Foot ulcer is a major health problem that leads to morbid life style. The prevalence of foot ulcer is approximately 1 to 2 % of total world population. Delayed wound healing is a significant health problem -particularly in older people [1]. In addition, to the pain and the suffering, failure of the wound to heal also imposes a social and financial burden to the society [2]. Foot ulcers may involve the skin's surface, full thickness of the skin, tendons and even bones. It is marked by inflammation, formation of pus and sloughing of damaged tissues [3]. Delayed wound healing is a significant health problem, particularly in older adults. In addition to the pain and suffering, failure of the wound to heal also imposes social and financial burden [4]. Causes foot ulcers include Type 1 & 2 Diabetics, peripheral neuropathy, and peripheral artery disease, Raynaud's phenomenon, Venous Insufficiency, and Injuries resulting in traumatic ulcers [5,6].

Main stay of foot ulcer treatment begins with the type of foot ulcers as per types treatments varies. Main

stay of treatment is wound debridement and dressing [7,8 and 9] . If the ulcer is due to neuropathic ulcer then the ulcer mainly the treatment depend on the pressure ulcer due to the loss of sensation due to peripheral neuropathy. If the ulcer is due to arterial disease the ulcer is accessed for vascularity by clinical examination also with the use of Doppler study and angiogram [10]. According to the vascularity treatment mode is decided. Newer method of treatments such as injection of plasma rich protein, offloading, and negative pressure wound therapy and other modalities gain more importance in recent days [11].

Vacuum-assisted closure (VAC) therapy has been developed as an alternative to the standard forms of wound management, which incorporates the use of controlled negative pressure using vacuum-assisted closure (VAC) device to optimise conditions for wound healing and requires fewer painful dressing changes. It promote wound healing by removing fluid from open wounds, preparing the wound bed for closure, reducing oedema, and promoting formation and perfusion of granulation tissue [12,13]. Total contact casting is another promising method used to treat diabetic foot ulcers by fitting a non-removable cast around the affected leg. One of the primary reasons for treating diabetic foot ulcers with total contact casting is offloading, or limiting the use of the foot with the ulcer.

In this study we are comparing the efficacy of vacuum assisted closure method also called as negative pressure wound therapy and offloading technique mainly total contact cast for healing of the foot ulcer. To know which of the two methods give promising results.

Materials and Methods

Prior ethics approval for this study was obtained from the Ethical committee of the Vinayaka mission‘s medical college and hospital, Karaikal. Informed and written consent taken from all the participants. A total of 122 Patients were involved in this study. They were divided into two groups. Group I (n=70) patients treated with vacuum dressing. Group II (n=52) patients treated with offloading technique. The study period is 2 years.

Calculation of PUSH score

Pressure Ulcer Scale for Healing (PUSH) score was calculated according to the standard measures. Categorization of the ulcer was done with respect to surface area, exudate, and type of wound tissue. Recorded subscore for each of these ulcer characteristics. The sub-scores were calculated into total score. A comparison of total scores measured over time provides an indication of the improvement or deterioration in pressure ulcer healing was done.

Length x Width measurement

The greatest length (head to toe) and the greatest width (side to side) were measured using a centimetre ruler. These two measurements (length x width) were multiplied to obtain an estimate of surface area in square centimetres (cm2).

Estimation of exudate

The amount of exudate (drainage) after removal of the dressing and before applying any topical agent to the ulcer was estimated. The tissue or wound type scoring was done according to the standard measures.

Statistical analysis

Descriptive Statistics were used to summarise the distribution of the demographic and clinical variables. Frequency chart and pie diagram were used to compare the variables of descriptive statistics 5.7.2 Data Analysis was carried out using Statistical Package for Social Science (SPSS Version 20.0) package.

Results

In this prospective randomised hospital based study we compared the efficacy of vacuum assisted closure and offloading technique in healing of the foot ulcers which was designed after approval of our research topic by the Ethical committee of our college. We selected a total of 122 patients with foot ulcers, satisfying the inclusion and exclusion criteria. Informed and written consent were obtained from all the patients included in the study.

Sex Distribution

In the total study population of 122 patients 76.2% are male population and 23.8% are female population. Highest number of population belongs to male sex of 76.2%.

Distribution of Comorbid Conditions

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In the total study population of 122 patients 60.7 % of the study population have diabetic mellitus as comorbidity and 0.5% has hypertension as comorbidity and 20.5% have both hypertension and diabetic mellitus as co morbidity .18% of the total study population don't have any of the co morbidity (Figure 1)

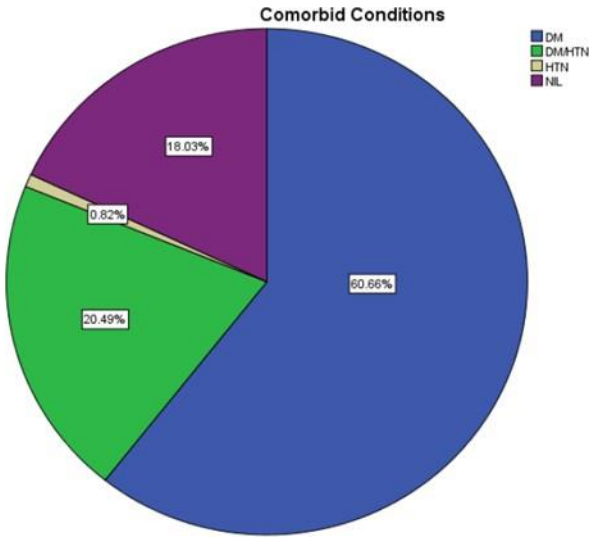

Figure 1 - Distribution of Comorbid Conditions (DM-Diabetes Mellitus; HTN-Hypertension)

Distribution of Treatment Methods

In total of 122 study population 70 patients (57.4%) were assigned to treat with vacuum assisted closure method and 52 patients (42.6%) were assigned to treat with Total Contact Cast method.

Distribution of Age

In total of 122 study population mean age distribution of the population was 53.72 in VAC group and 53.43 in TCC group .There were no significant difference in the mean age group distribution between VAC AND TCC group.

Distribution of PUSH Scores

In study population of 122 patients mean deviation of change in the PUSH score of both VAC group and TCC group is 7.17 with a standard error of 0.317. In the study population of total of 122 patients 70 patient underwent VAC treatment and 52 patients underwent TCC treatment .Mean difference between the initial treatment and after treatment with VAC is 9.39 and TCC is 4.19 with standard mean error of 0.292 and 0.316 respectively. Mean difference between two group is 5.19 and p value is 0.000 which is significant (Figure -2)

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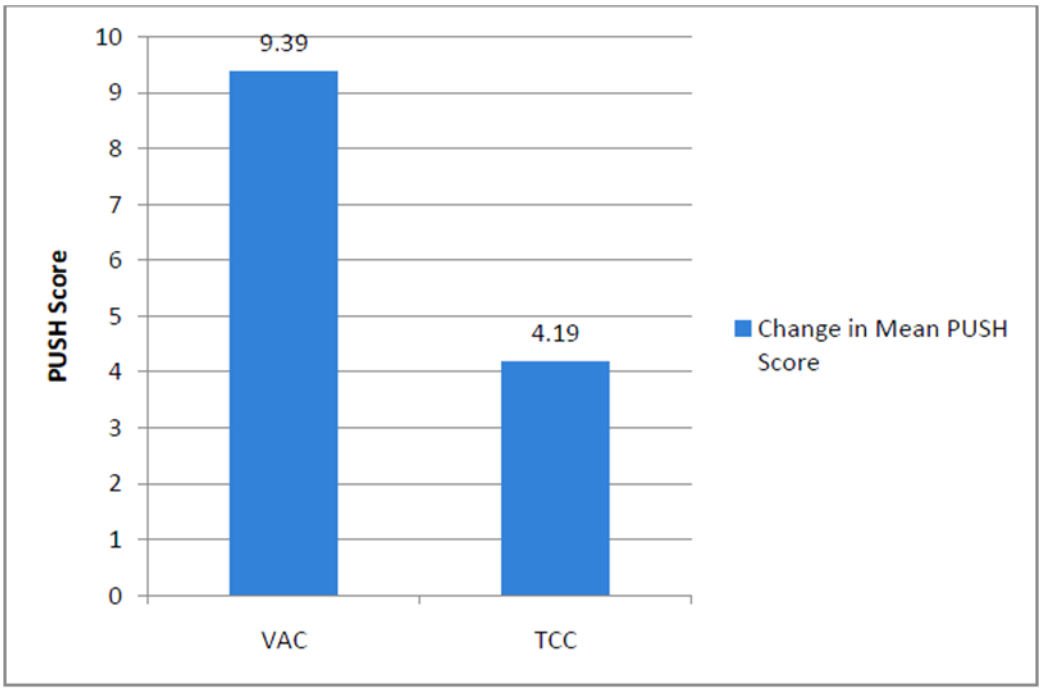

Figure 2 - Change in PUSH Scores by Treatment Methods

Descriptive Analysis of Wound Size and Hospital Stay

Mean deviation of the initial wound size is 23.55 and final wound size is 5.98 with standard mean error of 0.869 and 0.584 respectively. Mean hospital stay for including both the group is 36.15 with standard error of 1.902 (Table 1 and Figure 3). Mean wound size reduction in area is 17.20 with standard error of 0.867 and mean wound size reduction in percentage is 74.20 with standard error of 2.227.

Table 1 - Descriptive Analysis of Wound Size and Hospital Stay

	N	Minimum	Maximum	Mean	Std. Error
Wound Size-Initial	122	3	60	23.55	0.869
Wound Size-Final	122	1	30	5.98	0.584
Stay in Days	122	5	118	36.15	1.902
Size Reduction in Area	122	2	52	17.57	0.867
Size Reduction in Percentage	122	16.67	97.14	74.20	2.227

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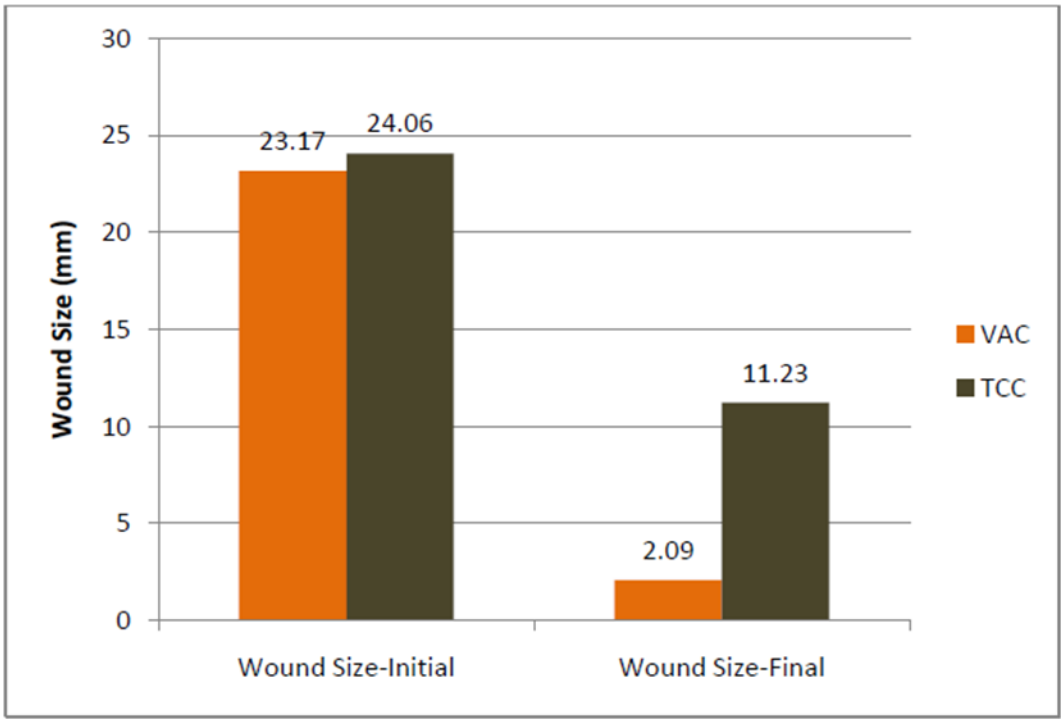

Figure -3 Descriptive Analyses of Mean Wound Size

Comparative analyses of wound size by treatment methods

In VAC group initial wound size of 70 patients and TCC patients of 52 patients with mean value of 23.17 and 24.06 respectively, with standard error in mean of 1.043 and 1.489 respectively. Mean difference between VAC and TCC IS -0.886. P value of the mean difference between VAC and TCC is 0.616.which is insignificant (Figure 4). Wound size final mean value in VAC and TCC is 2.09 and 11.23 respectively. Mean difference between VAC and TCC is -9.145 with P value of 0.000 which is significant.

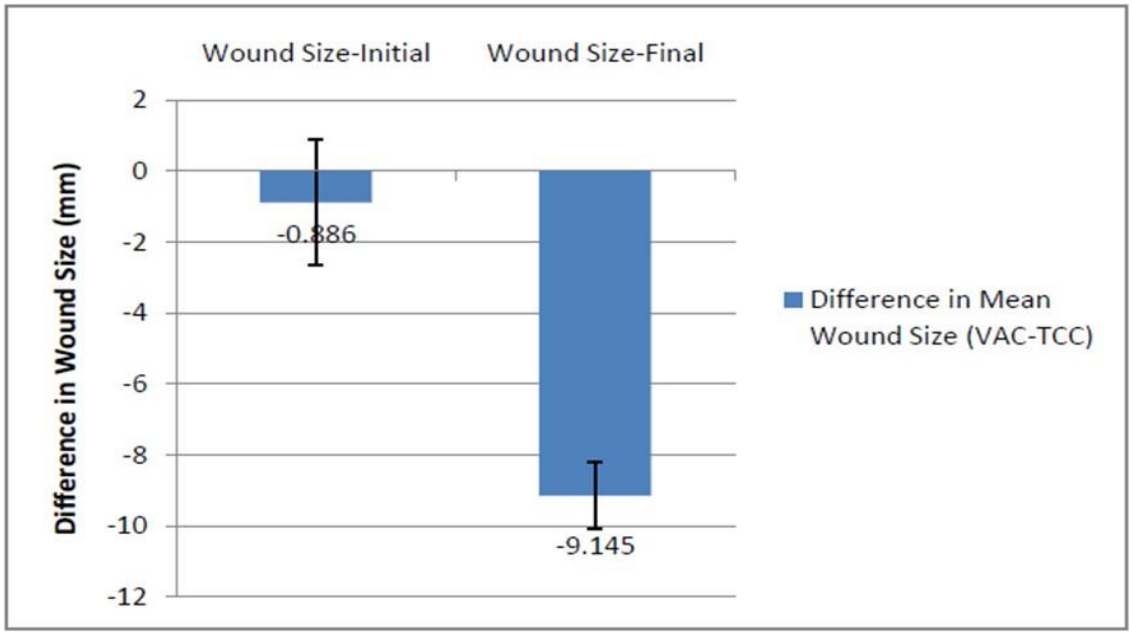

Figure 4 - Comparative analyses of wound size by treatment methods

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Comparative Analyses of percentage of reduction of Wound surface area by Treatment Methods

In VAC group , mean percentage reduction of wound surface area is 90.43 with standard error of 1.098.and in TCC group mean percentage reduction in surface area in 52.36 with standard error of 3.018.Mean difference of percentage of the wound surface area reduction is 38.068. P value is 0.000 which is significant (Figure 5A and B).

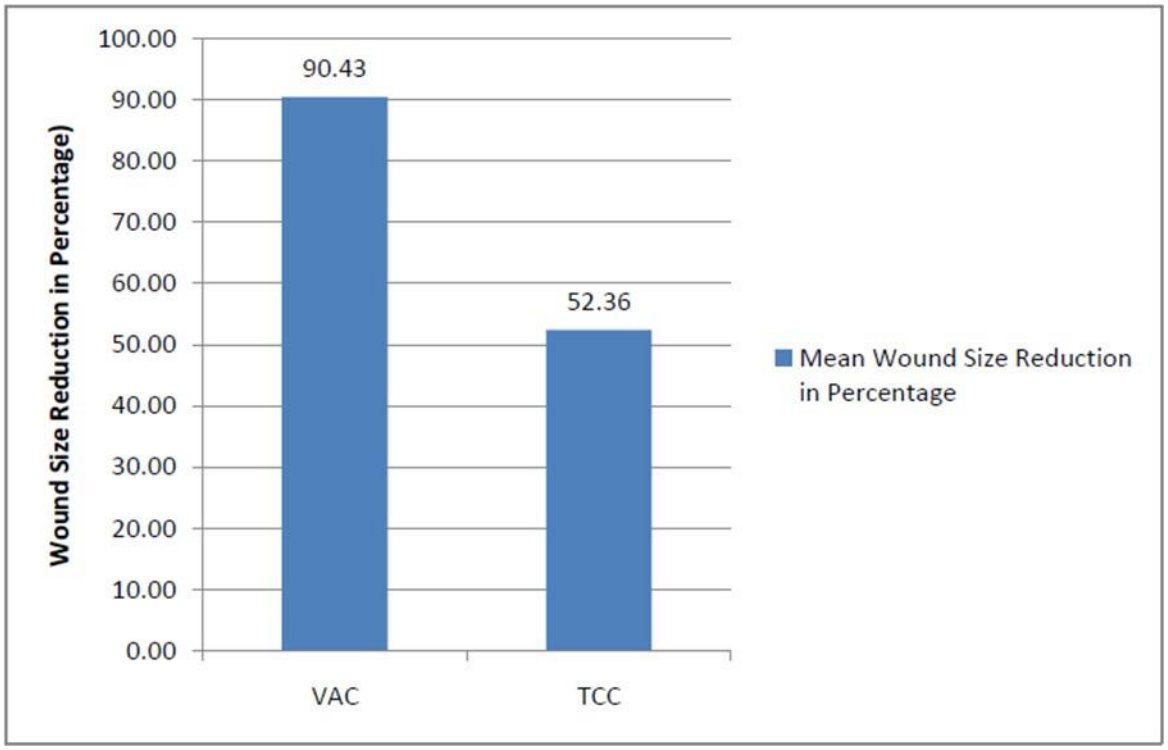

Figure 5 – Mean wound size reduction in percentage

Figure 6- Wound recovery by vaccum assisted closure

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Analyses of Hospital stay by Treatment Methods

In VAC group mean hospital stay is 24.90 with standard error of 1.425 and in TCC group is 51.29 with standard error of 2.932. Mean difference between the VAC and TCC group is -26.388 with P value of 0.000 which is significant (Figure 6)

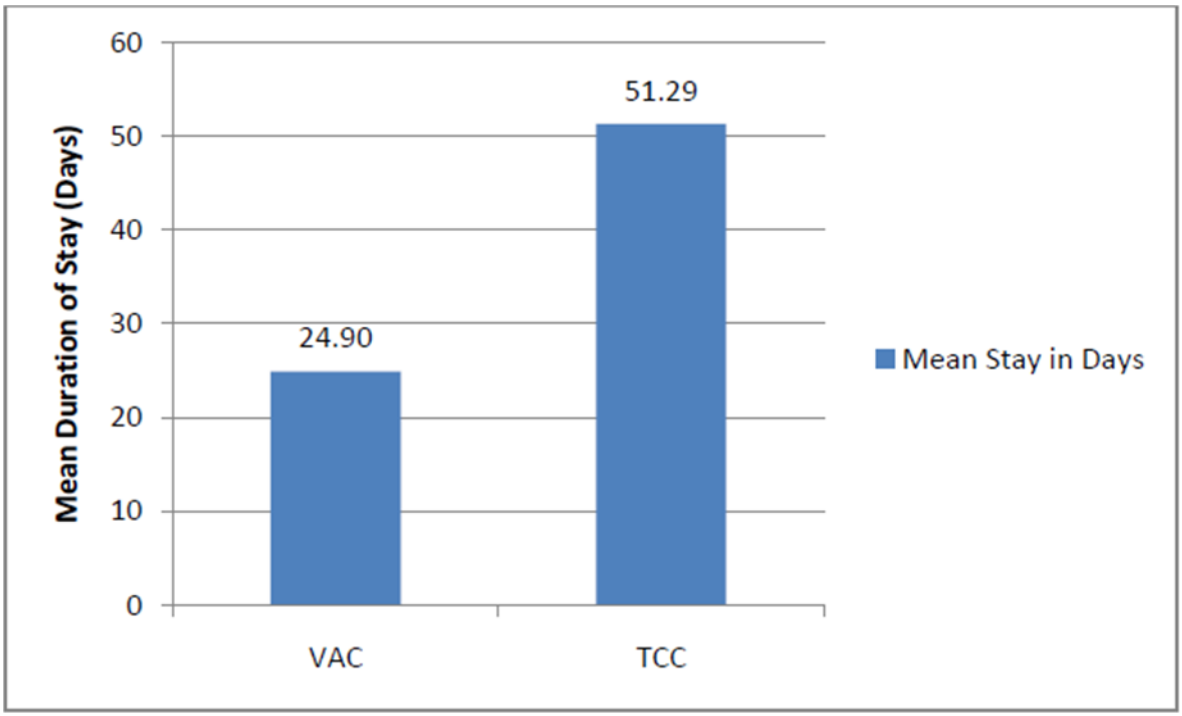

Figure 6 – Mean stay in days

Discussion

India is the top 3rd country in the world in the prevalence of diabetics 'mellitus. Diabetes cases up to 422 million worldwide; India ranks among top 3 countries with diabetic population. According to the Lancet study, China, India and USA are among the top three countries with a high number of diabetic populations [13, 14, and 15]. Negative pressure wound therapy was first described by Fleischman et al ., in 1993 done in 15 patients with open fractures and reported efficient cleaning and conditioning of the wound with marked increased proliferation of granulation tissue with no bone infection or soft tissue infection [16, 17] .In this prospective randomised hospital based study we compared the efficacy of vacuum assisted closure and offloading technique in healing of the foot ulcers which was designed after approval of our research topic by the Ethical committee of our college. We selected a total of 122 patients with foot ulcers, satisfying the inclusion and exclusion criteria. Informed and written consent were obtained from all the patients included in the study. In our study, out of 122 patients, 70 patients were allotted for VAC and 52 patients were allotted for offloading technique. Sloughed out wound were debrided for initial period. Then VAC and TCC were allotted to the patients. PUSH scoring was assessed at the time of admission and during the change of dressings in each method and plotted in a graph. Wound size was measured with the use of ECG paper. PUSH score was determined by wound size, exudate amount and granulation tissue. Then wound surface area and percentage of reduction in the wound surface area was calculated respectively. Also the duration of the hospital stay was also recorded. Statistical analysis was done using the SPSS version 20 software and results were generated. Both study groups has a mean difference of age which is insignificant and so the study is comparable. Also the null hypothesis is retained on the admission in both study groups.

Results of the study is evaluated by comparing with PUSH score, wound reduction in terms of size, percentage and surface area, and also duration of

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hospital stay. And p value of all these parameters is which shows VAC is more efficient and gives more promising result than the offloading technique. Hence we conclude our study as; vacuum assisted closure is far superior and more effective in terms of healing of the foot ulcer than Offloading technique

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Transverse testicular ectopia: A surgical surprise

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Abstract
Crossed Testicular Ectopia / Transverse Testicular Ectopia is a rare but well known congenital anomaly in which both gonads migrate towards same Hemiscrotum. Most of the cases were found associated with other abnormality such as Persistent Mullerian Duct Syndrome, Inguinal hernia, Hermaphroditism and other scrotal abnormality. Most of the cases reported in literature are children with very few reports in adults. About 100 cases of Transverse Testicular Ectopia were reported in literature till now. We report a case of Transverse Testicular Ectopia in a 42 year old gentleman presented with partially reducible Left Inguinal Hernia with non-palpable Right Testis. On exploration, one testis with rudimentary Uterus and bilateral rudimentary Fallopian tubes were present in Left Inguinal Canal while another testis in Left Hemiscrotum. Castration with left hernioplasty done as the patients is adult.

Keywords: TTE (transverse testicular ectopia), PMDS (persistent Mullerian duct syndrome), hermaphroditism, crossed testicular ectopia

Introduction
Transverse Testicular Ectopia otherwise called as Crossed Testicular Ectopia/Testicular Pseudoduplication /unilateral double testis is a rare but a well-known entity where both the testis migrates towards the same hemiscrotum [1]. In literature more than 100 cases were reported till date. Often diagnosis is made on surgical exploration. There are five known types of testicular ectopia: superficial inguinal (interstitial), femoral (crural), perineal, pubopenile, and crossed (transverse) [2]. Transverse Testicular Ectopia can be suspected if there is ipsilateral inguinal hernia with contralateral undescended testis [3]. The inguinal hernia invariably presents on the side where the ectopic testis has migrated [4]. Associated abnormalities may include Persistent Mullerian Duct Syndrome (PMDS), true hermaphroditism, inguinal hernia, hypospadias, pseudohermophroditism, defects of abdominal wall, and scrotal anomalies [5]. The lack of awareness leads to delay in diagnosis and accidental detection during surgery for inguinal hernia. We report a case of Transverse Testicular Ectopia presented as left inguinal hernia.

Case Report
42 year old gentleman presented with left inguinal swelling of 6months duration. Swelling increases in size while lifting heavy objects. Patient is married for 15 years with primary infertility with normal sexual function. On examination, there is a globular swelling of size 6X5cm in the left inguinal region; swelling was partially reducible and expansile impulse on cough-present. There was a palpable testis in left hemiscrotum with absent testes in right hemiscrotum. The scrotum was normally developed. Secondary sexual characters were normal. Basic investigations were normal. Seminal Analysis showed azoospermia. Ultrasonography of scrotum showed both testicle on left side, one in the left inguinal canal and another in the left hemiscrotum. Ultrasonogram of abdomen showed no significant abnormality in abdomen and KUB area. A provisional diagnosis of Transverse Testicular Ectopia was made. On exploration, rudimentary uterus with bilateral rudimentary fallopian tubes and atrophic testis was present as hernia content. A diagnosis of Persistent Mullerian Duct Syndrome with Transverse Testicular Ectopia was made. B/L Orchidectomy was done and biopsy taken from mullerian remnant. Deep Ring was closed, Hernioplasty was done. Post-operative periods uneventful.

Figure description 1 and 2: showing rudimentary uterus with b/l rudimentary fallopian tube and b/l atrophied testis as hernial sac content

Discussion

Transverse Testicular Ectopia (TTE) is a rare form of testicular ectopia. TTE was first described by von Lenhossek in 1886 in a cadaver. [5] Holsted published the first case of testicular ectopia in English literature followed by 100 cases and more. Several theories regarding the embryogenesis of TTE have been postulated namely adhesion and fusion of developing Wolffian canals, aberrant gubernaculum, testicular adhesions, defective formation of the internal inguinal ring, and traction on a testis by persistent Mullerian structures [5]. Berg proposed that there is a possibility of the development of both testes from the same genital ridge. Gupta and Das [6] proposed that early adherence and fusion of the developing Wolffian ducts, the descent of one testis has caused the second one to follow [6]. Persistant Mullerian Duct Syndrome develops due to the result of failure of synthesis or release of Mullerian duct inhibiting factors or due to failure of end organs to respond or defect in timing of release of Mullerian inhibiting factors.[5]An inguinal hernia invariably presents in the side where the ectopic testis has migrated. [6] On the basis of presence of various associated anomalies Transverse Testicular Ectopia has been classified into three types:

Type 1: Associated with only hernia it contributes about 40-50%.

Type 2: Accompanied with Persistent or rudimentary Mullerian structures.

Type3: Associated with hypospadiasis, scrotal abnormality and pseudo hermaphrodite [4].

According to this classification, our case comes under Type 2.

Mean age of presentation of Transverse Testicular Ectopia is 4 years. Clinically it presents as inguinal hernia in one side with contralateral cryptorchidism. Diagnosis of TTE is made mostly during surgical exploration for inguinal hernia repair due to unawareness of the condition. So every surgeon operating on inguinal hernia should be well aware of this condition.

Malignant transformation of gonads is the major risk of patients with TTE. Incidence of malignant transformation of gonads is 18% as per studies includes embryonal carcinoma, seminoma, yolk sac tumour, and teratoma. [7] Walsh *et al*. [8] conducted a study and concluded that the incidence of testicular cancer increased to 6 times if the orchidopexy has been delayed until after the age of 10-11years of age. Wood *et al*. [9] conducted a study and concluded that risk of malignancy in undescended testicles decreased if their orchiopexy performed before ages 10 to 12 years. In almost 97% of patients with Crossed Testicular Ectopia have disorders associated with upper and lower urinary tract system. There is no report of malignancy arising from the retained Mullerian structures, and the absence of MIS does not appear to increase the relative risk of testicular malignancy [10, 11] Hysterectomy is, hence, not recommended routinely in patients who have obvious uterus and fallopian tubes [11]. Extensive dissection of vas deferens and excision of persistent Mullerian duct structures should be avoided in order to prevent the injury [11].

Once the diagnosis of TTE is made, surgical treatment for fertility preservation and placement of testis in hemiscrotum is the best method in younger age group. In our case the patient is 42yrs old and chances of malignant transformation are high so bilateral orchidectomy done. In younger individual, diagnostic laparoscopy should be performed to look for Mullerian remnant and to access the cord length, vascularity and any other proximal attachment can be made out. According to intra-abdominal finding, various surgical treatments can be given. If there is adequate length of the vas deferens and cord then transseptal orchidopexy is the choice. Another method is trasseptal contralateral orchidopexy or transabdominal orchidopexy if the length of the cord with vascularity is limited [11].

Conclusion

Transverse testicular ectopia is a rare congenital disorder with unclear pathology. Diagnosis of transverse testicular ectopia should be suspected if there is unilateral inguinal hernia with contralateral cryptorchidism. Ectopic testis can lie in superficial ring, inguinal canal, deep ring or intra-abdominal cavity. In suspected case diagnostic laparoscopy and ultra-sonogram or CT can be considered as investigation of choice. Laparoscopy at present is useful for both diagnostic and therapeutic management of Transverse Testicular Ectopia and associated anomalies. Bilateral orchidectomy can be considered if the patient's age is more than 12yrs.

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Chapter
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TRANSVERSUS ABDOMINIS MUSCLE RELEASE; A NOVEL TECHNIQUE IN COMPLEX VENTRAL HERNIAS-A SHORT CASE SERIES

ABSTRACT: Introduction: Surgical repair of complex ventral hernia repairs are difficult to perform and are associated with peri-operative complications and recurrence. Many surgical techniques have been studied to improve the outcomes of complex ventral hernia repairs and Transversus abdominis muscle release technique is one such procedure.

Objectives: To find out the outcome of transversus abdominis muscle release (TAR) procedure done in patients with complex ventral hernia.

Materials and method: A prospective study was done among 10 patients with complex ventral hernia presented to General Surgery department of Vinayaka mission's medical college and hospital, Karaikal for a period of 1 year. All the patients underwent transversus abdominis muscle release with sub-lay mesh by open method. The patients were discharged on 7th postoperative day.

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All the patients were followed up for a period of 6 months to identify the outcomes of the procedure and any delayed complications after discharge from the hospital. The results of the study are analysed and presented in the form of mean with standard deviation and percentage.

Results: Mean age of the patients was 59.4 years ranging from 45 to 76 years. Among the total 10 patients, 6 (60%) were females. Majority (40%) of the patients had incisional hernia. The most common previous surgical procedure was hysterectomy. Average duration of hernia among the participants was 3.4 years. The average size of the defect was 6.3 cm and 2 patients had multiple defects. During the stay in hospital, 2 patients (20%) developed wound related complication such as seroma formation. At the end of 6 months of follow-up there was no recurrence of hernia in the patients.

Conclusion: Short term follow-up of TAR procedure had shown that the technique is effective in repair of complex ventral hernia without any significant complication and recurrence.

Key words: ventral hernia, transversus abdominis muscle release, effectiveness, repair, outcome

INTRODUCTION

Ventral hernia of abdomen are non-inguinal, non-hiatal defect in the fascia of abdominal wall which leads to protrusion of intestine or other tissue through the defect/weakness in the abdominal wall. Ventral hernia could be acquired or congenital and majority of the ventral hernias are acquired. The common causes of acquired ventral hernia include previous surgery which results in incisional hernia and trauma. Hernia can also occur through naturally occurring weak points of abdominal wall such as umbilicus, semi lunar line, bilateral inguinal regions, ostomy sites, and esophageal hiatus.[1]

Ventral hernia repairs are associated with higher rates of peri-operative complications and recurrence. The common perioperative complications include abdominal compartment syndrome and respiratory failure. Identifying appropriate surgical procedure is thus important to reduce the recurrence and the complications and to improve the quality of life of the patients.

Previous studies with traditional suture and mesh techniques for treatment of ventral hernia without relaxing the musculofascial flaps has shown that this procedure is associated with unfavorable results. Component separation technique (CST) for the management of huge primary and incisional abdominal wall hernias was developed to improve the outcomes of hernia repair.[2]

Novitsky et al had reported a novel and promosing approach to the posterior component separation procedure by performing transversus abdominis muscle release (TAR).[3]

TAR procedure is lateral extension of Rives – Stoppa repair by creating a large space between transversus abdominis muscle (TA) and the fascia transversalis peritoneum complex. The present study was carried out to identify the short term outcome of transversus abdominis muscle release with sub-lay mesh fixation by open method.

Objectives

To find out the outcome of transversus abdominis muscle release procedure done in patients with complex ventral hernia.

MATERIALS AND METHODS

- Study design: Prospective study.
- Study period: One year from October 2021 to September 2022.

- Study area: Department of General Surgery, Vinayaka mission's medical college and hospital, Karaikal.
- Study population: Patient with complex ventral hernias such as, large incisional hernia, recurrent incisional hernia, large umbilical and paraumbilical hernias.
  - Inclusion criteria:
    - Patients aged more than 20 years.
    - Patients with large incisional hernia(defect >8cms), recurrent incisional hernia, umbilical and para umbilical hernias which are large in size.
  - Exclusion criteria: Small ventral hernial defects.

  A total of 10 patients were studied who fulfilled the inclusion and exclusion criteria during the study period.
- **Surgical procedure**
  - Transversus abdominis muscle release procedure (TAR) is an extension of the rives operation. All patients underwent TAR procedure with sub-lay mesh fixation by open method. Midline laparotomy incision was made. Hernial sac was identified and dissected to the fascial border of the hernial ring.
  - Hernial sac and peritoneum are mobilized from the fascial hernial ring. Posterior rectus sheath medially incised longitudinally. Rectus abdominis muscle was completely separated from the posterior rectus sheath to the lateral edge of the rectus muscle compartment. The retro-muscular plane in the rectus muscle compartment is developed. Dissection was extended cranially approximately 4cm below xiphisternum.
  - After creating the retro-rectus plane, posterior lamella of the internal oblique aponeurosis incised 1-1.5cm medial to the neurovascular bundle. Transversus abdominis muscle was exposed. Transversus abdominis fibres are divided superiorly and inferiorly to enter the pre-peritoneal space.

- Mesh pocket space created by sweeping transversus abdominis muscle laterally by exposing fascia transversalis. Posterior rectus sheath was closed in the midline using absorbable suture. Mesh placed in the sub-lay fashion- retro-rectus plane drain should be kept above the mesh. Anterior rectus sheath closed by non-absorbable suture material.

All patients were followed up post operatively for the period of 6 months.

RESULTS

The study results are presented for 10 patients who underwent TAR procedure in a period of 1 year.

Mean age of the patients was 59.4±9.6 years which was ranging from 45 to 76 years. Among the total 10 patients, 6 (60%) were females and the rest 4 (40%) were males. Mean age among females was 57.83 ±11.7 years and among males it was 61.75±6.2 years. Among the total patients, 5 did not have any co-morbidity and the remaining 5 had co-morbidity which includes diabetes mellitus in 2 patients (20%), systemic hypertension in 2 patients (20%) and diabetes mellitus and systemic hypertension together in 1 patient (10%).

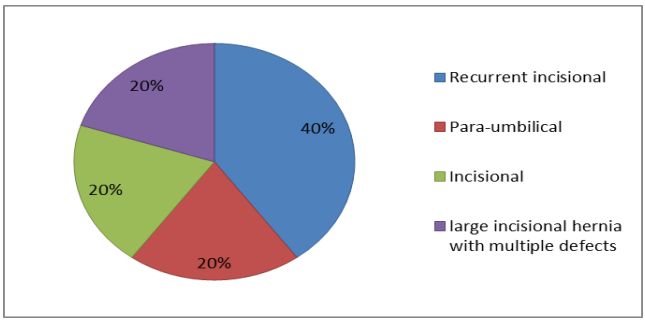


Figure 1: Pie chart depicting type of hernia

Figure 1: depicts the type of hernia among the 10 patients. Majority had recurrent incisional hernia followed by para-umbilical, incisional and large incisional hernia with multiple defects which were present in 2 patients each. Average duration of hernia among the participants was 3.4±1.6 years with minimum of 1 year and maximum 6 years.

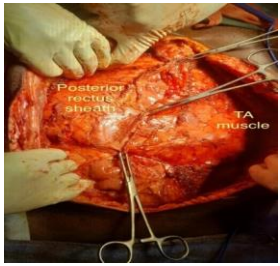
Table 1: Details of previous surgeries done in the patients

Previous surgery	Frequency	Percent
Hysterectomy	3	30.0
Laparotomy	2	20.0
LSCS	1	10.0
Midline laparotomy	2	20.0
NIL	2	20.0
Total	10	100.0

Table 1 depicts details of previous surgical procedures done in the patients. The most common procedure was hysterectomy. The average size of the defect was 6.3±0.89 cm which was ranging from 5 cm to 8 cm and 2 patients had multiple defects.

All the patients underwent TAR procedure with sub-lay mesh fixation by open method. The patients were discharged on the 7th post-operative day.

Preoperative picture of a patient



Intra-operative picture


Sub-lay mesh fixation

During the stay in hospital, it was found that 2 patients (20%) developed wound related complication such as seroma formation. There was no mortality in the patients and there was no deep surgical site infection or any other complication in the patients.

All the patients were followed up for a period of 6 months following surgery. Follow-up visit at the end of 6 months showed that there was no recurrence of hernia and mesh infection among the all 10 cases.

DISCUSSION

The current study used TAR technique with sub-lay mesh fixation in the retro-rectus plane. Since the tension is released, large pre-peritoneal space can be created which allows easy fixation of large, polypropylene mesh that

helps in reducing further recurrence of hernia. Intra-operatively the large defect could be closed without any tension with this procedure. Fixing large mesh ensures better strengthening of abdominal wall.

In the present study, 20% of the patients developed wound complication in the form of seroma. Similar to our study, another study by Oprea et al reported wound complications in 21% of the patients.[4] In another study published by Oprea et al, wound complications was reported in 29% of the patients which included hematoma, seroma and surgical site infection.[5]

The duration of follow-up was 6 months in the present study and at the end of the follow-up period there was no recurrence. Similar to the current study, another study by Opera et al also reported no recurrence with average duration of 11.8 months of follow-up.[4] A study by Chaves et al reported the rate of relapse of 12.7% in patients who underwent TAR procedure. However, this was reported following one year of follow-up after the procedure.[6]

None of the patients in the present study developed deep surgical site infection (SSI). Similarly, another study report by Chaves et al also reported proportion of patients with deep SSI as 0%.[6]

Modified TAR procedure has also been developed and reported in few studies which are minimally invasive. These minimally invasive modified TAR procedure includes laparoscopic transperitoneal TAR technique, endoscopic extraperitoneal TEP TAR technique, endoscopy assisted mini or less open (MILOS) TAR technique, Robotic‐assisted TAR procedure and Madrid TAR modification procedure.[7-13]

CONCLUSION

Transversus abdominis muscle release technique is an effective procedure in patients presenting with complex

ventral hernias. This procedure is associated with less surgical complications and it has better outcome in terms of having no recurrence during the short term follow-up in the present study.

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