

Outcomes of Hysterectomy in Women with Prior Cesarean Section: Retrospective Analysis of Non-Descent Vaginal Hysterectomy (NDVH) Versus Abdominal Hysterectomy (TAH) in Benha University Hospital

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ABSTRACT

Objective: To compare perioperative outcomes in women with one or more Cesarean section (CS) who underwent Total vaginal hysterectomy (TVH) compared to who underwent total abdominal hysterectomy (TAH) for non-prolapse indications.

Materials and Methods: A retrospective observational cohort analysis included 335 women with previous \geq one CS underwent hysterectomy (HR) performed between January 2015 and March 2023 in Benha university hospital and private center comparing the outcomes between non-descent vaginal hysterectomy (NDVH) and TAH. The NDVH group (study group) included 155 women with previous \geq one CS who underwent TVH for non-prolapse indications. The TAH group (control group) included 180 women with previous \geq one CS who underwent TAH for non-prolapse indications. Both groups were evaluated statistically to detect differences in pre-, intra-, and post-operative demographic characteristics as well as clinical parameters and complications.

Results: Both index and study groups participants had were comparable as regards age, parity, pre-operative mean hemoglobin levels, associated comorbidities, previous CS numbers and similar indications for hysterectomy, but higher statistical preoperative HbA1c and shorter preoperative hospital administration ($p < 0.0001$) supporting the NDVH group over the TAH group. There were no difference between the study and the control groups respecting operative time, blood loss, removed uterine weight, intra-operative complications, need for blood transfusion and rates of incidental cystotomy ($p > 0.05$). While there was a high statistical differences ($p < 0.0001$) toward outcomes of NDVH over TAH including need for additional general anesthesia intraoperatively, shorter postoperative hospital stay, wound complications, less consumption of analgesic and lower amount as well as shorter need for postoperative venous thromboembolic prophylaxis (VTE), earlier ambulation, earlier to pass flatus, earlier return to daily activity and the lower need to reoperate for wound related complication.

Conclusion: In women with previous \geq one CS with non-prolapsed uteri who in need later on their life for hysterectomy, NDVH is a safe choice, and the real gynecologists shouldn't considered any more the previous CS even repeated CS as a contraindication to utilize the vaginal route for hysterectomy, even more recommending the NDVH practice as the perioperative parameters are appealing NDVH over TAH especially regarding wound related complication.

Key Words: Cesarean section, hysterectomy, non-descent vaginal hysterectomy, retrospective study, total abdominal hysterectomy, vaginal hysterectomy.

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INTRODUCTION

Cesarean section (CS) is the most common major surgery performed in USA^[1], Canada^[2], and worldwide^[1,3], in Egypt despite that there is no national registry we thought that the CS rate could reach up to 95% even more. Hysterectomy (HR) is the most common major gynecologic surgery and the second most common surgical procedure performed in women, after CS, in USA^[3], Canada^[2] and worldwide^[3]. In Egypt, the state regarding HR is messy and most of hysterectomies were performed abdominally and mostly subtotal and by general practitioners of surgical specialties.

A recent Cochrane Review concluded that total vaginal hysterectomy (TVH) in general is better than total abdominal hysterectomy (TAH)^[4]. Given the high prevalence of both CS and HR, a lot of women who have had a previous CS will need HR later in their life^[1,2,3]. Previous pelvic surgeries, including CS's, may lead to formation of significant intra-abdominal adhesions, especially along the previously dissected bladder^[5,6]. Previous CS has been found to be associated with an increased odds of surgical complications in women undergoing HR later in their life^[7]. A meta-analysis of observational studies in 2019 founded a higher risk of various perioperative complications following HR for gynecological conditions

among women with at least one previous CS, particularly the risks for urinary tract injury^[8]. A history of laparotomies increases the risk of conversion from TVH to laparotomy, and consequently increasing the operative time (LOP) and costs^[9] and the number of complications^[8]. Surgeon experience and volume of surgery can affect LOP, complication rates, risk of conversion from minimally invasive hysterectomy (MIH) to laparotomy, length of hospital stay (LOS), costs, and surgical approach taken for HR for benign disease^[8].

Scientific societies including American College of Obstetricians and Gynecologists (ACOG), American Association of Gynecologic Laparoscopists (AAGL), Society Obstetrics and Gynecology of Canada (SOGC) and International Society for Gynecologic Endoscopy (ISGE)^[10,11,12,13] as well as the medical literature^[14,15,16] supported TVH over other routes of HR, as it is superior in terms of patient safety, economics, cosmesis, and perioperative morbidity. Society of Gynecologic Surgeons (SGS) members in USA^[17,18,19] debated extensively the editorial article of AAGL prior president "Vaginal Hysterectomy: Historical Footnote or Viable Route?"^[20] and favouring the vaginal route over others as it is the genuine MIH and at the same time it is the authentic natural orifice surgery (NOS). Coulam and Pratt^[21] found early at 1973 in their retrospective analysis that a prior CS isn't a contraindication to TVH however it seems that the title of the article was misleading and was understood in opposite direction as this was the concept of surveyed gynecologists in USA and UK^[22,23]. In Egypt vaginal route for HR is preserved for prolapse even in such situation some operated abdominal or laparoscopic, and only few gynecologists had the concept of trialing most candidates for HR vaginally^[24,25,26,27].

This study aimed to compare perioperative outcomes in women with previous CS underwent either non descent vaginal hysterectomy (NDVH), which is a TVH for non-prolapse indications and women with previous CS underwent total abdominal hysterectomy (TAH) as well as to determine whether there is a difference in the complications rate between the vaginal and the abdominal routes of hysterectomy for patients with a previous CS and to determine the procedure with the least morbidity.

PATIENTS AND METHODS

This is a retrospective observational cohort study in which, all available records and charts either paper or electronic of women with previous one or more CS whom underwent either NDVH between January 2015 and March 2023 at obstetrics and gynecology department of Benha university hospital, Benha, Egypt and private cases made by ashraf elmantwe were examined and relevant parameters were extracted and structured while data of TAH group were decided to be collected from HR cases operated by senior consultant at the same level or higher after 2020

only in benha university hospital exclusivity. Ethical approval was obtained from Benha faculty of medicine ethical committee (NO: RC.38.5.2023). Written consent from participants was unneeded as this is a retrospective study as well as our institutional review board (IRB) policy.

Women were included if they had all the following criteria: (1) women with prior \geq one CS, (2) non-descent uteri \geq second degree uterine descent even under anesthesia, (3) patient's age \geq 18 years old (4) execution of general or spinal anesthesia, (5) the execution of hysterectomy via vaginal or abdominal route, (6) benign uterine diseases, (7) clinical follow-up until completely cured or \geq 30 days postoperatively.

We excluded women if they had one or more of the following criteria: (1) women with suspected malignancy; (2) women founded to be second degree uterine decent or more after execution of the anesthesia; (3) women with prior lower abdominal surgery other than CS, (4) patients in whom a major surgical intervention other than hysterectomy was executed; (5) cases with incomplete medical records or who failed to be followed for 30 days postoperatively.

Pre-operative collected data included age, height, weight, body mass index (BMI), parity, indications for hysterectomy, comorbid conditions as hypertensive disorders, diabetes mellitus, renal disorders, liver diseases, orthopedics problems and airway obstructive disorders, previous abdominal or vaginal surgery, length of preoperative hospital administration (LOPA) to control the comorbid status as uncontrolled diabetes mellitus and hemoglobin (HB) concentration (CBC), as well as percentage of glycated hemoglobin A1C (HBA1C) in diabetic women.

Intra-operative collected outcomes were type of surgical techniques either conventional suturing or vessel sealing based procedures as well as additional procedures as bilateral salpingo-oophorectomy, cystectomy, repair of damaged visceral organ as urinary bladder, additional techniques like morcellation as in NDVH, operative time (from time of surgery initiation to surgery termination), type of anesthesia either general or spinal, estimated blood loss (EBL) (based on gauze weight, visual blood volume estimation), Intra-operative complications included major blood vessel or organ injury (including bowel, bladder and ureter) and need for blood transfusion.

Post-operative collected data were length of postoperative hospital stay (LOS), HB concentration (CBC), return to theatre; pelvic or vault hematoma, vault cellulitis, vault dehiscence, vault abscess, abdominal wound status in TAH group including cellulitis, seroma collection, wound dehiscence, length of wound care, need to reoperate on wound sequels, pelvic Infection, urinary

tract infection, thromboembolic disease, other medical status deterioration as well as hospital readmission. The collected parameters of all included women in this analysis were structured and anonymized.

Outcome items were: 1) Operative time (LOP), 2) Operative blood loss (EBL), 3) Operative complications as blood transfusion, conversion in case of NDVH or relaparotomy in TAH, bowel or visceral injuries, 4) change in hemoglobin(HB gm/dl) value (the difference between preoperative and postoperative HB) (Δ HB gm/dl), 5) Early postoperative follow up including: (a) length hospital stay (LOS) (b) Percentage of severe and very severe postoperative pain, (c) Febrile morbidity (body temperatures $> 38^{\circ}\text{C}$ in two consecutive measurements > 4 hour apart), (d) Need for analgesic drugs and its amounts, (e) Time to pass stool or gas from end of the operations, (f) Time to get out of bed activity (hours). 7) Time to return to their daily activities.

Statistical analysis:

Statistical analysis was performed by Medcalc easy-to-use statistical software for windows desktop (www.medcalc.org) 2016 (Medcalc, software, bvba). Continuous variables were given as mean \pm 2 standard deviations and range, unpaired independent two samples student's t test was used to compare normally distributed continuous variables while Mann-Whitney U test was reserved for nonnormally distributed variables between the index and control groups. Categorical variables were given as number and percentage and were assisted using either Fisher's exact test or Pearson's Chi-square test as analysis methods to identify differences between the index and control groups. Statistical significance was deemed if p was < 0.05 .

RESULTS

A 335 women with prior \geq one CS were included in this retrospective trail, 155 women were underwent NDVH (index group) in between January 2015 and March 2023 in Benha university hospitals and private centers all were operated vaginally by ashraf elmantwe, while 180 women were underwent TAH (control group) after 2020 in Benha university hospitals were operated abdominally by senior consultant.

The clinical and demographic characteristics of participants with prior \geq one CS underwent NDVH or TAH were presented in (Table 1). women in both study and control groups were comparable and there were no significant differences in respect to age, BMI, parity, Clinical uterine size (weeks), Ultrasound uterine volume Cm^3 , absent of prior vaginal birth, postoperative uterine weight (gram), preoperative hemoglobin (gm/dl), the associated preoperative medical comorbidities as well as the indication for hysterectomy. While there were a

statistically Significant differences regarding the women percentage with uncontrolled diabetes mellitus (DM) ($p < 0.005$) which was higher in NDVH group, while the Length of Preoperative Administration (LOPA) to control the medical comorbidities was too shorter in NDVH group ($p < 0.0001$) and the pre-Operative Glycated Hemoglobin A 1C (PHBA1C) ($p < 0.004$) was higher in NDVH group as presented in (Table 1), all this differences could be explained on basis that the NDVH patients were operated vaginally where no abdominal wound was suspected and so lowering preoperative HBA1C deemed unimportant and this was an intuitive of NDVH operator to shorten the preoperative as well as the postoperative hospital stay.

The intraoperative outcomes parameters of women with prior \geq one CS in NDVH group (index) and TAH group (control) were presented in (Table 2). The differences between groups regarding total operative time (min), operative blood loss (ml), Intraoperative complications including the visceral injuries, blood transfusion weren't statistically Significant. There were 5 cases of conversion to laparotomy in NDVH group all were found to had extensive adhesions between anterior abdominal wall and anterior uterine wall likely to be severely ventro-fixed uteri where after posterior colpotomy was performed and even in some case reaching funds from posterior aspect procedures couldn't propagated more. There were a statistically Significant differences between groups regarding percent of women with prior \geq one CS underwent conventional suturing surgical procedures who were more in TAH group while women with prior \geq one CS underwent Vessel sealing surgical procedures were more in NDVH group ($p < 0.0006$). TAH group women were significantly converted to general anesthesia in ($p < 0.0001$) while most women in NDVH arm were significantly competed under initial spinal anesthesia ($p < 0.0001$). In all women in NDVH group a morcellations techniques were utilized while in TAH group such procedures were very infrequent ($p < 0.0001$). In NDVH arm more patients significantly underwent bilateral salpingectomy (BS) ($p < 0.0001$), while in TAH arm significantly excess women underwent bilateral Salpingo-Oophorectomy (BSO) ($p < 0.0001$) this could be attributed gynecologists' attitude toward such issues. As regards vesical injuries there were no differences ($p = 0.6$) in rates between both groups, in NDVH group there were 11/155(7%), all were repaired by the primary gynecologist while in TAH group there were 12/180 (6%), also repaired by the primary gynecologist, all women whom had an incidental cystotomy and primary repair shows sound postoperative sequel regarding this complications.

Table (3) presented the early and late postoperative outcomes parameters in this retrospective review. Women with prior \geq one CS in NDVH group shown a lower percentage of severe pain status at 6h ($P < 0.0001$) and 24 h postoperative ($P < 0.0007$) and a lower utilization

of analgesia both narcotic ($P<0.0001$) and (NSAID) Non-steroidal anti-inflammatory drugs (NSAID) ($P<0.0001$). There wasn't a significant difference between both index and control groups as regards the decline in 24-hour hemoglobin ($P= 0.2$), also there weren't significant differences between both study and control groups regards Febrile morbidity ($p=0.7$), pelvic cellulitis ($p=0.72$), cystitis ($p=0.27$). The differences were statistically significant between NDVH and TAH groups regards the time to get out of bed ($p,0.0001$), time

to pass flatus ($p<0.0001$), length of postoperative hospital stay (LOS) ($p,0.0001$), return to usual activity time (day) ($p<0.0001$), wound complications($p<0.0001$), reoperation for wound ($p=0.004$), need for venous thromboembolism (VTE)prophylaxis(days) ($p<0.0005$) and duration of VTE prophylaxis(days) ($p<0.0001$), all this items supporting superiority of TVH over TAH. It was noticed that the vaginal spotting ($p=0.001$) was significantly higher in NDVH group but this deemed clinically insignificant in postoperative course.

Table 1: Demographic and clinical characteristics of women with \geq one CS underwent NDVH or TAH.

Variable	NDVH (no =155)	TAH (no = 180)	P value
- Age (year)	45.6 \pm 6.4 (39 – 52)	44.8 \pm 5.7 (38– 56)	0.22
- Parity	2.8 \pm 2.5 (1- 9)	3.1 \pm 2.4(1– 10)	0.26
- BMI (kg/m ²)	31.1 \pm 4.6 (21.5 – 51.5)	30.3 \pm 5.8 (22.5 – 49.6)	0.16
- Clinical uterine size (weeks)	9.9 \pm 3.1 (6 – 18)	10.6 \pm 3.8 (6 – 30)	0.06
- Ultrasound uterine volume Cm ³	155 \pm 86 (50 – 800)	165 \pm 77 (60 – 1500)	0.26
-Postoperative uterine weight(gm)	260 \pm 116 (60 – 1050)	280 \pm 122 (65 – 1950)	0.12
-Absent of previous vaginal birth	54(34%)	65(36%)	0.70
-preoperative HB (g/dl)	11.1 \pm 2.8(10.2-13.5)	11.6 \pm 3.5(10.1-12.9)	0.15
- Previous pelvic surgery:			
- one CS	78(55%)	83(46%)	0.10
- two CS	37(23%)	42(23%)	1.00
-three CS	27(17%)	33(18%)	0.81
- four or more CS	13(8%)	17(9%)	0.74
- Previous vaginal surgery	15(9%)	24(13%)	0.24
- Comorbidity:			
- HTN	30(19%)	42(23%)	0.37
- DM	25(16%)	40(22%)	0.16
- uncontrolled DM	24(15.4%)	11(6.1%)	0.005
-PHBA1C (%)	6.4 \pm 2.1(4.1%-12.1%)	7.1 \pm 2.3(4.4%-13.2%)	0.004
-LOPA (days)	3.4 \pm 1.2(1-10)	11.5 \pm 3.5(1-45)	0.0001
- Indication for hysterectomy:			
- PMB	67(43%)	89(49%)	0.27
- EH	24(15%)	24(13%)	0.59
-CIN	18(11%)	23(12%)	0.77
- Adenomyosis	38(24%)	45(25%)	0.83
- Fibroid	54(34%)	76(42%)	0.13

Abbreviations: CS: Cesarean section, **NDVH:** Non-Descent Vaginal Hysterectomy, **TAH:** Total Abdominal Hysterectomy, **BMI:** Body Mass Index, **HTN:** Hypertension, **DM:** Diabetes Mellitus, **PMB:** Perimenopausal Bleeding, **EH:** Endometrial Hyperplasia, **CIN:** Cervical Intraepithelial Neoplasia. **PHBA1C (%):** Pre-Operative Glycated Hemoglobin A1C, **LOPA:** Length of Preoperative Administration.

- Values were given as mean \pm standard deviation (range) or number (percent).
 $P<0.05$: Statistically significances

Table 2: Comparison of intra-operative outcome measures between women with \geq one CS underwent NDVH or TAH

Outcome	NDVH (no = 155)	TAH (no = 180)	Δ (95% CI)	P value
Total operative time (min)	115 \pm 64 (93 – 170)	124 \pm 55 (85-1176)	9 (-3.7 to 21.7)	0.16
Conventional surgical procedures	87(56%)	170(94%)	38 % (29.2%to 46.2%)	0.0001
Vessel sealing surgical procedures	68(43%)	10(5%)	38% (29.3% to 46.2%)	0.0001
Operative blood loss (ml)	325 \pm 160(310-730)	450 \pm 170(380 -940)	125(89.3 to 160.6)	0.0001
General anesthesia	33(21%)	135(75%)	54 % (44.1% to 62.1%)	0.0001
Spinal anesthesia	122(78%)	45(25%)	53% (43.1% to 61.1%)	0.0001
Additional techniques	155(100%)	18(10%)	90% (84.2% to 93.5%)	0.0001
Intraoperative complications*				
- visceral injuries	11(vesical) (7%)	12(vesical) (6%)	1% (-4.4% to 6.7%)	0.71
- blood transfusion	9(5%)	15(8%)	3% (-2.6% to 8.4%)	0.27
-conversion to laparotomy	5(3%)	n.a		
Concomitant procedures				
-BS	66 (42%)	44(24%)	18% (7.9% to 27.6%)	0.0005
- BSO	35(22%)	114(63%)	41% (30.8% to 49.8%)	0.0001
- others	15(9%)	28(15%)	6% (-1.1% to 12.9%)	0.09

Abbreviations: CS: Cesarean section, **NDVH:** Non-Descent Vaginal Hysterectomy, **TAH:** Total Abdominal Hysterectomy, **Δ (95% CI):** Point estimate difference with 95% confidence interval, **BS:** Bilateral salpingectomy, **BSO:** Bilateral Salpingo-Oophorectomy, **n.a:** non applicable.

- Values were given as mean \pm standard deviation(range) or number (percent).

$P < 0.05$: Statistically significances

Table 3: Comparison of early and late postoperative outcome measures between women underwent NDVH and TAH.

Outcome	NDVH (no = 155)	TAH (no = 180)	Δ (95% CI)	P value
Postoperative pain				
- severe at 6h	45(29%)	125(69%)	40%(29.6%to 49.1%)	0.0001
- severe at 24h	25(16%)	58(32%)	16%(6.8% to 24.6%)	0.0007
Analgesic requirements over 24h				
-Total narcotic (mg)	13.8 \pm 4.2(5-50)	25.2 \pm 5.8(20-70)	11(10.2 to 12.5)	0.0001
-Total parental NSAID (mg)	130.5 \pm 45.54(100-350)	245.5 \pm 121.6(200-600)	115 (94.6 to 135.3)	0.0001
Time to get out of bed (h)	4.6 \pm 1.4(2-18)	7.8 \pm 3.6(6-48)	3.2 (2.5 to 3.8)	0.0001
Time to flatus(h)	5.1 \pm 3.2(3-24)	12.4 \pm 9.2(9-46)	7. 3(5.7 to 8.8)	0.0001
decline in hemoglobin at (24h)	1.5 \pm 1.4(.9-1.9)	1.3 \pm 1.6(1.2-2.2)	-0.2(-0.52 to 0.12)	0.22
LOS (days)	2.5 \pm 0.5(1-15)	17.6 \pm 8.9(4-56)	15.1(13.6 to 16.5)	0.0001
Return to usual activity time (day)	5.4 \pm 1.7(2-18)	34.3 \pm 12.9(14-96)	28.9 (26.8 to 30.9)	0.0001
Febrile morbidity	28 (18.0%)	35 (19.4%)	1.4% (-7.1% to 9.6%)	0.7
Vaginal spotting	28 (37.4%)	15(8.3%)	29.1% (20.2.% to 37.4%)	0.0001
Pelvic cellulitis	9 (5.8%)	16(8.8%)	3% (-2.6. % to 8.4%)	0.2713
Cystitis	13(8.3%)	14(7.7%)	1.4% (-4.7 %to 7.1%)	0.72
Wound complications	3(1.9%)	45(25%)	23.1%(17.4% to 30.8%)	0.0001
Reoperation for wound	2(1.2%)	19(10.5%)	9.3% (4.3% to 14.7%)	0.0004
Need for VTE prophylaxis(days)	22(14.1%)	54(30%)	15.9% (7.02 %to 24.3 %)	0.0005
Duration of VTE prophylaxis(days)	1.2 \pm 1.1 (0-6)	8.5 \pm 7.4 (0-16)	7.3 (6.1 to 8.4)	0.0001

Abbreviations: CS: Cesarean section, **NDVH:** Non descent vaginal hysterectomy, **TAH:** Total Abdominal Hysterectomy, **Δ (95% CI):** Point estimate difference with 95% confidence interval, **NSAID:** Non-steroidal anti-inflammatory drugs, **VTE:** venous thromboembolism, LOS: length of postoperative stay in hospital

- Values were given as mean \pm standard deviation or number percent.

$P < 0.05$: Statistically significances.

DISCUSSION

Prior CS increases the risk for perioperative complications of patients underwent HR in general not only who underwent TVH as deduced in systematic reviews and meta-analyses^[4,9]. The percentage of perioperative complications didn't significantly increase with the increasing number of CSs. Our study results towards NDVH group agreed with Delara *et al.*^[28] as well as Unger and Meeks^[29] who studied the impact of prior CS on TVH outcomes as regrades lower cystotomy rates.

Our early and late postoperative results in both groups are in parallel with Kroft *et al.*, Canadian population-based study as they reported a lower rate of surgical complications within 30 days of surgery for those patients with a previous CS undergoing vaginal hysterectomy than abdominal approaches^[2].

We found higher incidences of incidental vesical injures in women with \geq previous CS undergoing HR either as NDVH or TAH despite we didn't reported this in this study results as we didn't include women HR without prior CS, this likes what was deduced in 2019 systematic review and meta-analysis on perioperative complications of hysterectomy after a previous cesarean section^[8]. We found no difference in incidental vesical injures based the route of HR in women with \geq one CS, this rate was lower as reported results of Canadian population-based study by Kroft *et al.*, whom claimed that their study was the first to compare impact of HR route on rate of incidental cystotomy and found to be lower in vaginal routes than with abdominal and laparoscopic routes^[2]. Our result regarding incidental cystotomy were typical as Rooney *et al.*, 2005^[30] whom deduced that CS is a significant risk factor for incidental cystotomy at the time of HR (odds ratio [OR] 2.04; 95%CI 1.2-3.5) and the OR of incidental cystotomy at the time of TAH, TVH in a woman with CS was 1.26, 3.00 respectively which was statistically insignificant ($P > .05$).

During NDVH in women with scared uteri secondary to CS, gynecologists first attacked native part of vesico-uterine space tissues this is in contrary to situation of TAH where surgeon firstly operated on scared part of vesico-uterine space tissues, so we recommended not to consider a prior CS as a contraindication to TVH. Utilizing vesico-uterine windows lateral to adherent central part as recommend by Seth^[31] and Kovac^[32] by gynecologist index finger could lead to safe blunt anterior peritoneal entry. So, we suggest that the gynecologic surgeon should not be deterred from performing TVH in patients with a prior CS because there is no increased risk for surgical incidental complications. Joiners should take every opportunity to trial potential candidates for hysterectomy vaginally as possible, the vaginal approach to hysterectomy for treatment of benign gynecologic disease should be considered for all patients regardless of a prior cesarean delivery.

We discussed the risk of incidental cystotomy in detail as it is the major concern of all gynecologists, furthermore all cases of incidental cystotomy were repaired primary by principal operator gynecologist without urologic consultation. The results of this study were in agreement with results of trails comparing outcomes of TVH and TAH as regarded all postoperative outcomes as reported in 2015 Cochrane database Systematic review^[4] and in 2019 systematic review and meta-analysis^[8], where they found that the TVH was superior than TAH and TLH in terms like cosmosis, postoperative pain, costs and earlier return to usual activity.

Our study strengths included its retrospective nature being low cost and assessing real work situation, relative larger sample size to get an inferences as well as comparing NDVH to TAH in women with prior CS undergoing hysterectomy, addressing surgical outcomes specifically in patients with prior CS who underwent NDVH, challenging an actual well known alleged contraindications to TVH as morbid obesity, nulliparity, lack of uterine mobility and bulky uterine size.

The limitations of this analysis were being retrospective subjecting it to selections biases, reporting biases, confounders such surgical experience of the gynecologists as well as inability to generalizing the outcomes as the skills of NDVH were limited and underutilized as all over the world.

CONCLUSION

The main outcome of our study is that non descent vaginal hysterectomy (NDVH) isn't associated with greater incidental cystotomy than TAH in women with prior \geq CS undergoing hysterectomy and CS shouldn't be considered any more as a contraindications for total vaginal hysterectomy (TVH). The preferred procedure to operate NDVH is utilizing the vessel sealing vaginal hysterectomy rather than conventional suture vaginal hysterectomy whenever such devices are available as well as adapting the concept of that the gynecologist should go vaginally.

ABBREVIATIONS

CS: Cesarean section

NDVH: Non Descent Vaginal Hysterectomy.

TVH: Total Vaginal Hysterectomy.

TAH: Total Abdominal Hysterectomy

SOGC: Society Obstetrics and Gynecology of Canada

AAGL: American Association of Gynecologic Laparoscopists

ISGE: International Society of Gynecologic Endoscopy

ACOG: American College of Obstetricians and Gynecologists

PHBA1C: Pre-Operative Glycated Hemoglobin A 1C,
LOPA: Length of Preoperative Administration.
VTE: venous thromboembolism
BS: Bilateral salpingectomy,
BSO: Bilateral Salpingo-Oophorectomy

CONFLICT OF INTEREST

There are no conflicts of interests.

REFERENCES

- Betran AP, Ye J, Moller AB, Zhang J, Gulmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: global, regional and national estimates: 1990–2014. *PLoS One*. 2016;11(2):e0148343. doi:10.1371/journal.pone.0148343PONE-D-15-47913.
- Kroft J, McCaffrey C, Kim E, Jolliffe C, Liu GY, Saskin R, Gatley JM, Ordon M. Surgical Outcomes Between Routes of Hysterectomy in Patients with a Previous Cesarean Section. *Journal of Minimally Invasive Gynecology*. 2023 Jan 13.
- Rattanakanokchai S, Kietpeerakool C, Srisomboon J, Jampathong N, Pattanittum P, Lumbiganon P. Perioperative complications of hysterectomy after a previous cesarean section: A systematic review and meta-analysis. *Clinical Epidemiology*. 2019 Dec 31 :1089-98.
- Aarts JW, Nieboer TE, Johnson N, *et al*. Surgical approach to hysterectomy for benign gynaecological disease. *Cochrane Database Syst Rev*. 2015;2015:CD003677.
- Levin D, Tulandi T. Dense adhesions between the uterus and anterior abdominal wall: a unique complication of cesarean delivery. *Gynecol Surg*. 2011; 8:415–416.
- Ramkrishna Purohit, Jay Gopal Sharma, Devajani Meher, Sanjay Raosaheb Rakh & Minal Choudhary (2018) A laparovaginal strategy to avoid bladder injury during laparoscopic-assisted vaginal hysterectomy in cases with ventrofixed uterus following previous cesarean section, *International Journal of Women's Health*, 10:, 579-587, DOI: 10.2147/IJWH.S173258
- Lindquist SAI, Shah N, Overgaard C, *et al*. Association of previous Cesarean delivery with surgical complications after a hysterectomy later in life. *JAMA Surg*. 2017;152:1148–1155
- Rattanakanokchai S, Kietpeerakool C, Srisomboon J, Jampathong N, Pattanittum P, Lumbiganon P. Perioperative Complications of Hysterectomy After a Previous Cesarean Section: A Systematic Review and Meta-Analysis. *Clin Epidemiol*. 2019;11:1089-1098 <https://doi.org/10.2147/CLEP.S235429>
- Cho HY, Kim HB, Kang SW, Park SH. When do we need to perform laparotomy for benign uterine disease? Factors involved with conversion in vaginal hysterectomy. *J Obstet Gynaecol Res* 2012 Jan;38(1):31-4. DOI: <http://dx.doi.org/10.1111/j.1447-0756.2011.01657>.
- Yong PJ, Thurston J, Singh SS, Allaire C. Guideline No. 386-Gynaecologic Surgery for Patients with Obesity. *Journal of Obstetrics and Gynaecology Canada*. 2019 Sep 1;41(9):1356-70.
- Matteson KA, Butts SF. ACOG Committee opinion No 701: choosing the route of hysterectomy for benign disease. *OBSTETRICS AND GYNECOLOGY*. 2017 Jun 1;129(6):E155-9.
- AAGL Advancing Minimally Invasive Gynecology Worldwide. AAGL Position Statement: Route of hysterectomy to treat benign uterine disease. *J Minim Invasive Gynecol*. 2011;18:1–3.
- Chrysostomou A, Djokovic D, Edridge W, van Herendael BJ. Evidence-based practical guidelines of the International Society for Gynecologic Endoscopy (ISGE) for vaginal hysterectomy. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 2020 Sep 1;252:118-26.
- Sheth SS. *Vaginal Hysterectomy*. 2nd ed. Jaypee Brothers (UK) Medical Publishers LTD.; 2014.
- Schmitt, Jennifer, DO, MS, Occhino, John, *et al*. Outcomes of Vaginal Hysterectomy With and Without Perceived Contraindications to Vaginal Surgery. *Female pelvic med. reconstr. surg*. 2019;25(1):41-48. doi:10.1097/SPV.0000000000000469
- Jha, S. and Tooze-Hobson, P. (2022), Vaginal hysterectomy. *Obstet Gynecol*, 24: 205-210. <https://doi.org/10.1111/tog.12814>
- Gebhart JB, Schmitt JJ, Baker MV, Occhino JA, McGree ME, Weaver AL, Bakkum-Gamez JN, Dowdy SC, Pasupathy KS. Vaginal Hysterectomy: Historical Footnote or Viable Route? *Obstet Gynecol*. 2020 Aug;136(2):426. doi: 10.1097/AOG.0000000000004030.
- Pancheshnikov, Anna, Acharya, Ami, Harmanli, Oz. Vaginal Hysterectomy: Historical Footnote or Viable Route?. *Obstet Gynecol*. 2020;136(2):424. doi:10.1097/AOG.0000000000004019.

19. Parker, William, Levy, Barbara. Vaginal Hysterectomy: Historical Footnote or Viable Route?. *Obstet Gynecol.* 2020;136(2):423-424. doi:10.1097/AOG.0000000000004018.
20. Advincula, Arnold. Vaginal Hysterectomy: Historical Footnote or Viable Route?. *Obstet Gynecol.* 2020;135(4):759-760. doi:10.1097/AOG.0000000000003814.
21. Coulam CB, Pratt JH. Vaginal hysterectomy: is previous pelvic operation a contraindication? *Am J Obstet Gynecol.* 1973 May 15;116(2):252-60. doi: 10.1016/0002-9378(73)91060-0. PMID: 4712423.
22. Miskry T, Magos A. A national survey of senior trainees surgical experience in hysterectomy and attitudes to the place of vaginal hysterectomy. *BJOG: An International Journal of Obstetrics & Gynaecology.* 2004 Aug;111(8):877-9.
23. Einarsson JI, Matteson KA, Schulkin J, Chavan NR, Sangi-Haghpeykar H. Minimally invasive hysterectomies-a survey on attitudes and barriers among practicing gynecologists. *J Minim Invasive Gynecol.* 2010 Mar-Apr;17(2):167-75. doi: 10.1016/j.jmig.2009.12.017. PMID: 20226403; PMCID: PMC3038434.
24. Elmantwe, A., Ibrahim, A. Role of interleukin -6 (IL-6) in evaluating surgical stress after total abdominal hysterectomy (TAH) and non-descent vaginal hysterectomy (NDVH). *The Egyptian Journal of Fertility of Sterility,* 2016; 20(2): 12-19. doi: 10.21608/egyfs.2016.19529
25. Elmantwe, A. Bipolar Endometrial Resection (BER) Versus Non Descent Vaginal Hysterectomy (NDVH) For Leiomyoma Induced Heavy Menstrual Bleeding. *The Egyptian Journal of Fertility of Sterility,* 2017; 21(1): 9-16. doi: 10.21608/egyfs.2017.19223.
26. Assar, T., Elmentawy, A., Mosaad, A., Abdelazim, E. Role of Incisional infiltration with intraperitoneal instillation analgesia in non descent vaginal hysterectomy. *Evidence Based Women's Health Journal,* 2017; 7(4): 155-162. doi: 10.21608/ebwhj.2018.5583
27. Nassif, A., Elnory, M. Impact of prophylactic bilateral salpingectomy on ovarian reserve in women undergoing vaginal hysterectomy: A randomized controlled trial. *Evidence Based Women's Health Journal,* 2020; 10(2): 150-161. doi: 10.21608/ebwhj.2020.22949.1074
28. Rooney CM, Crawford AT, Vassallo BJ, Kleeman SD, Karram MM. Is previous cesarean section a risk for incidental cystotomy at the time of hysterectomy? A case-controlled study. *Am J Obstet Gynecol.* 2005; 193:2041–2044.
29. Delara R, Yi J, Girardo M, Wasson M. Perioperative outcomes of total vaginal hysterectomy in women with prior cesarean delivery. *Journal of Minimally Invasive Gynecology.* 2020 Nov 1;27(7):1603-9.
30. Sheth SS, Malpani AN. Vaginal hysterectomy following previous cesarean section. *Int J Gynaecol Obstet.* 1995 Aug;50(2):165-9. doi: 10.1016/0020-7292(95)02434-e.
31. S.R. Kovac The difficult vaginal hysterectomy. S.S. Sheth (Ed.), *Vaginal hysterectomy (second edition),* Jaypee Brothers Medical Publishers (P) Ltd, New Delhi, India (2014), pp. 172-179
32. Unger JB, Meeks GR. Vaginal hysterectomy in women with history of previous cesarean delivery. *Am J Obstet Gynecol.* 1998;179:1473– 1478.