

To Compare the Effectiveness of Vaginal High Uterosacral Ligament Suspension and McCall's Culdoplasty during Vaginal Hysterectomy for Pelvic Organ Prolapse

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ABSTRACT

Introduction: Vaginal vault prolapse can be prevented by supporting the vaginal cuff, which is an essential part of hysterectomy, whether done abdominally or vaginally. The American Association of Gynecologic Laparoscopists (AAGL) has recommended for future research, specifically, a randomized trial comparing McCall's culdoplasty (with uterosacral ligament plication) with vaginal high uterosacral ligament suspension (HUSLS) (without plication), since both procedures are accessible to gynecological surgeons without urologic background. Hence, this study was carried out.

Aim: To compare both anatomic and functional outcomes of patients undergoing vaginal HUSLS or McCall's culdoplasty at the time of vaginal hysterectomy.

Materials and methods: This hospital-based prospective comparative study was carried out at a tertiary care hospital from January 1, 2013 to December 31, 2015 over a period of 3 years after obtaining Ethical Committee approval. All women attending gynecological outpatient department having symptom of mass coming out of vagina were subjected to detailed history, examination, and later underwent either HUSLS (43) or McCall's culdoplasty (42), for vault suspension with concomitant hysterectomy. The effectiveness of both the procedures was assessed by preoperative and postoperative pelvic organ prolapse quantification (POP-Q) and both were compared.

Observations: There was statistically significant improvement in all the sites of POP-Q points by HUSLS and McCall's culdoplasty as a method of vault suspension except in total vaginal length (TVL). Vault suspension by HUSLS is better than McCall's culdoplasty. All the points of POP-Q showed better results but the point C was significantly placed at a higher level by HUSLS ($p = 0.000$) as compared with McCall's culdoplasty. The time required for HUSLS was statistically more as compared with repair by McCall's culdoplasty (81.55/74.53 minutes, $T: 1.981$, $p: 0.05$). Complications, such as hemorrhage and ureteric injuries were more in HUSLS (2/43, 4.8%) as compared with McCall's culdoplasty (0/42); this is statistically significant.

Conclusion: High uterosacral ligament suspension provides excellent suspensory support to vaginal vault. Vagina is suspended over the levator ani with normal axis toward sacrum. By

doing HUSLS, the vagina is symmetrically supported directed toward the hollow of sacrum. High uterosacral ligament suspension is highly recommended for young women with POP as vaginal length is not altered at all and so is the quality of life.

Keywords: McCall's culdoplasty, Vaginal high uterosacral ligament suspension, Vaginal hysterectomy.

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INTRODUCTION

Vaginal vault prolapse can be prevented by supporting the vaginal cuff, which is an essential part of hysterectomy, whether done abdominally or vaginally. The incidence of posthysterectomy vaginal prolapse varies from 0.2 to 43%.¹

A variety of procedures can be done for surgical treatment of POP in women who are fit for surgery. There are no evidence-based guidelines for the clinician to choose the best surgical technique for particular patient. The type of operation performed should be individualized according to patients' need, such as concomitant prolapse in other compartment(s), sexual activity, previous abdominal surgery, previous prolapse surgery, the TVL, and associated comorbidities. Women with complex (multiple compartment) prolapse and/or a history of extensive abdominal surgery can be quite challenging with the abdominal, laparoscopic approach and a vaginal approach may be appropriate.²

This lack of evidence-based guidelines significantly has impact on the ability to conduct, compare, and contrast clinical research in this area. Success of surgery is defined as per patient's functional status before and after prolapse surgery, and anatomic resolution (in operated and unoperated compartments) and relationship with symptoms.

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As per the Royal College of Obstetricians and Gynecologists Green-top Guideline No. 46 of 21 © Royal College of Obstetricians and Gynaecologists, HUSLS should only be offered as first-line management in women with POP within the context of research or prospective audit following local governance procedures.³

The AAGL has recommended for future research, specifically, a randomized trial comparing McCall's culdoplasty (with uterosacral ligament plication) with vaginal HUSLS (without plication), since both procedures are accessible to the nonurogynecologic surgeon. Hence, this study was conducted.⁴

AIM

To compare both anatomic and functional outcomes of patients undergoing vaginal HUSLS or McCall's culdoplasty at the time of vaginal hysterectomy.

MATERIALS AND METHODS

This hospital-based randomized controlled trial was carried out at a tertiary care hospital from January 1, 2013 to December 31, 2015 over a period of 3 years after obtaining Ethical Committee approval.

All women attending gynecological outpatient department having symptom of mass coming out of vagina were subjected to detailed history pertaining to demographic data, duration of prolapse, urinary symptoms as urgency, frequency, stress urinary incontinence, bowel symptoms as incomplete evacuation of bowel, dyspareunia, etc., affecting quality of life.

Detailed obstetric history, mentioning parity, frequency of childbirth, duration of labor, baby size, instrumentation, and postpartum rehabilitation, was asked.

Menstrual history, family history of prolapse, history of precipitating factors as chronic cough, constipation, mass in abdomen were also asked for.

After thorough general examination, per abdomen, cardiovascular system, and respiratory system examination and detailed local examination were done to know the level of vaginal prolapse, stage of prolapse, and thus the deficiency was assessed by per speculum, per vaginum, and per rectal examination and POP-Q staging.

Women with POP were subjected to investigations and surgery was decided depending on the age, level, compartment, and the stage of prolapse. All women underwent either HUSLS or McCall's culdoplasty with concomitant hysterectomy. The selection of procedure for the women was decided by computer-generated sheet by random sampling.

High uterosacral ligament suspension is an intraperitoneal vaginal procedure that traditionally uses permanent suture to suspend the vaginal apex to the remnants

of the intermediate portion of uterosacral ligaments at the level of the ischial spines and cephalad, with incorporation of the (often reconstructed) fibromuscular walls of the anterior and posterior vagina. Cystoscopy was done after every HUSLS before closure of the vault.

In 1957, the McCall culdoplasty was described in which the uterosacral ligaments are plicated in the midline, including the cul-de-sac peritoneum and posterior vaginal cuff. This obliterates the peritoneum of the posterior cul-de-sac and elevates the vault toward the plicated uterosacral ligaments. Several modifications of this procedure have been described regarding different number of sutures and different points of fixation.⁴

In our study, the surgery was done by a single surgeon. Following observations were made as duration of surgery. Complications, such as hemorrhage, injury to bladder and bowel, infection, secondary hemorrhage were looked for.

After the completion of the surgery, the effectiveness was judged by anatomical consideration of perineal body, size of hiatus, all nine points of POP-Q, the correction of vagina, and functionally by relief of symptoms by a structured validated questionnaire. Women were kept under follow-up for 1 year. And appearance of bothersome symptoms and clinical descent of vault after 6 months was labeled as treatment failure, and retreatment options were advised, done, and their outcome was noted.

Inclusion criteria

- All women with POP in reproductive, perimenopausal, and postmenopausal age group.
- Women with prolapse willing for follow-up.

Exclusion criteria

- Women with POP unfit for surgery.
- Women wanting conservative treatment.

Statistical analysis was done by sample statistics using paired and unpaired "t" testing Epi Info software version 6, level of significance = 0.05.

OBSERVATIONS

In the present study, the mean age of women in HUSLS group was 49.35 years and in the McCall's group was 49.60 years (t: 0.105, p: 0.917). Most of the women were para 3 and more in both the groups [H (46.9%), M (53.1%)], had level II, stage III, IV POP (p: 0.958, NS); hence, both the groups were comparable and multicompartiment defect was predominant feature in both the groups.

Table 1 shows the effectiveness of HUSLS. There was statistically significant improvement in all the sites of POP-Q points by HUSLS as a method of vault suspension except in TVL.

Table 1: Effectiveness of HUSLS

		Mean	Standard deviation	Standard error mean	t-value	p-value
<i>Paired samples statistics (HUSLS)</i>						
Pair 1	POP-Q preoperative in cm—Aa	2.02	0.963	0.147	20.33	<0.001
	POP-Q postoperative anatomical—Aa	-2.16	1.045	0.159		
Pair 2	POP-Q preoperative in cm—Ba	3.42	1.118	0.170	25.23	<0.001
	POP-Q postoperative anatomical—Ba	-1.37	0.757	0.115		
Pair 3	POP-Q preoperative in cm—C	3.91	1.288	0.196	32.13	<0.001
	POP-Q postoperative—C	-4.60	1.050	0.160		
Pair 4	POP-Q preoperative in cm—Ap	1.02	1.504	0.229	12.02	<0.001
	POP-Q postoperative anatomical—Ap	-2.12	0.931	0.142		
Pair 5	POP-Q preoperative in cm—Bp	1.23	1.837	0.280	9.23	<0.001
	POP-Q postoperative anatomical—Bp	-1.49	0.506	0.077		
Pair 6	POP-Q preoperative in cm—D	-1.33	2.936	0.453	8.064	<0.001
	POP-Q postoperative anatomical—D	-6.05	2.971	0.458		
Pair 7	POP-Q preoperative in cm—TVL	7.93	1.100	0.168	-1.325	0.192
	POP-Q postoperative anatomical—TVL	8.16	1.252	0.191		
Pair 8	POP-Q preoperative in cm—PB	3.04	1.084	0.167	-3.138	0.003
	POP-Q postoperative anatomical—PB	3.56	0.484	0.075		
Pair 9	POP-Q preoperative in cm—Gh	4.81	0.289	0.044	-1.95	0.058
	POP-Q postoperative anatomical—Gh	4.93	0.258	0.039		

AaBa: Anterior points on vaginal wall; ApBp: Points on posterior vaginal wall; C: Cervix; D: Pouch of douglas; TVL: Total vaginal length; Pb: Perineal body; Gh: Genital hiatus

Table 2 shows the effectiveness of McCall's culdoplasty. There was statistically significant improvement in all the sites of POP-Q points using McCall's culdoplasty.

Table 3 shows the preoperative comparison of HUSLS/McCall. The preoperative POP-Q points of the HUSLS group and McCall's culdoplasty group were not significant, hence, both groups are comparable.

Table 4 shows the postoperative comparison of HUSLS/McCall. Vault suspension by HUSLS is better than McCall's culdoplasty. All the points of POP-Q showed better results but the point C was significantly

placed at a higher level by HUSLS (p = 0.000) as compared with McCall's culdoplasty.

The time required for HUSLS was statistically more as compared with repair by McCall's culdoplasty (81.55/74.53 minutes; T: 1.981, p: 0.05).

Complications, such as hemorrhage and ureteric injuries were more in HUSLS (2/43, 4.8%) as compared with McCall's culdoplasty (0/42). This is statistically significant. Involvement of ureteric injuries warrants a postoperative cystoscopy in all women undergoing HUSLS for POP.

Table 2: Effectiveness of McCall's culdoplasty

		Mean	Standard deviation	Standard error mean	t-value	p-value
<i>Paired samples statistics (McCall)</i>						
	POP-Q preoperative in cm—Aa	1.67	0.928	0.143	19.88	<0.001
	POP-Q postoperative anatomical—Aa	-2.10	0.821	0.127		
	POP-Q preoperative in cm—Ba	2.98	1.297	0.200	18.68	<0.001
	POP-Q postoperative anatomical—Ba	-1.38	0.731	0.113		
	POP-Q preoperative in cm—C	3.62	1.081	0.167	26.12	<0.001
	POP-Q postoperative—C	-3.21	1.138	0.176		
	POP-Q preoperative in cm—Ap	0.81	1.311	0.202	11.61	<0.001
	POP-Q postoperative anatomical—Ap	-1.98	0.869	0.134		
	POP-Q preoperative in cm—Bp	0.95	1.780	0.275	7.97	<0.001
	POP-Q postoperative anatomical—Bp	-1.38	0.492	0.076		
	POP-Q preoperative in cm—D	-1.62	2.723	0.420	9.18	<0.001
	POP-Q postoperative anatomical—D	-6.24	2.184	0.337		
	POP-Q preoperative in cm—TVL	8.14	0.926	0.143	-1.83	0.075
	POP-Q postoperative anatomical—TVL	8.50	0.862	0.133		
	POP-Q preoperative in cm—PB	3.42	0.848	0.131	-1.94	0.058
	POP-Q postoperative anatomical—PB	3.70	0.456	0.070		
	POP-Q preoperative in cm—Gh	4.70	0.429	0.066	3.99	<0.001
	POP-Q postoperative anatomical—Gh	4.98	0.154	0.024		

AaBa: Anterior points on vaginal wall; ApBp: Points on posterior vaginal wall; C: Cervix; D: Pouch of douglas; TVL: Total vaginal length; Pb: Perineal body; Gh: Genital hiatus

Table 3: Preoperative comparison of HUSLS/McCall

	Vault suspension McCall/HUSLS	n	Mean	Standard deviation	Standard error mean	t-value	p-value
<i>Group statistics (preoperative)</i>							
POP-Q preoperative in cm—Aa	HUSLS	43	2.02	0.963	0.147	1.737	0.086
	McCall	42	1.67	0.928	0.143		
POP-Q preoperative in cm—Ba	HUSLS	43	3.42	1.118	0.170	1.686	0.096
	McCall	42	2.98	1.297	0.200		
POP-Q preoperative in cm—C	HUSLS	43	3.91	1.288	0.196	1.115	0.268
	McCall	42	3.62	1.081	0.167		
POP-Q preoperative in cm—Ap	HUSLS	43	1.02	1.504	0.229	0.698	0.487
	McCall	42	0.81	1.311	0.202		
POP-Q preoperative in cm—Bp	HUSLS	43	1.23	1.837	0.280	0.714	0.477
	McCall	42	0.95	1.780	0.275		
POP-Q preoperative in cm—D	HUSLS	43	-1.26	2.945	0.449	0.590	0.557
	McCall	42	-1.62	2.723	0.420		
POP-Q preoperative in cm—TVL	HUSLS	43	7.93	1.100	0.168	-0.963	0.338
	McCall	42	8.14	0.926	0.143		
POP-Q preoperative in cm—PB	HUSLS	42	3.04	1.084	0.167	-1.793	0.077
	McCall	42	3.42	0.848	0.131		
POP-Q preoperative in cm—Gh	HUSLS	43	4.81	0.289	0.044	1.41	0.162
	McCall	42	4.70	0.429	0.066		

AaBa: Anterior points on vaginal wall; ApBp: Points on posterior vaginal wall; C: Cervix; D: Pouch of douglas; TVL: Total vaginal length; Pb: Perineal body; Gh: Genital hiatus

Table 4: Postoperative comparison of HUSLS/McCall

	Vault suspension McCall/HUSLS	n	Mean	Standard deviation	Standard error mean	t-value	p-value
<i>Group statistics (postoperative)</i>							
POP-Q postoperative anatomical—Aa	HUSLS	43	-2.16	1.045	0.159	-0.331	0.742
	McCall	42	-2.10	0.821	0.127		
POP-Q postoperative anatomical—Ap	HUSLS	43	-2.12	0.931	0.142	-0.717	0.476
	McCall	42	-1.98	0.869	0.134		
POP-Q postoperative—C	HUSLS	43	-4.60	1.050	0.160	-5.858	0
	McCall	42	-3.21	1.138	0.176		
POP-Q postoperative anatomical—Ba	HUSLS	43	-1.37	0.757	0.115	0.055	0.956
	McCall	42	-1.38	0.731	0.113		
POP-Q postoperative anatomical—Bp	HUSLS	43	-1.49	0.506	0.077	-0.993	0.324
	McCall	42	-1.38	0.492	0.076		
POP-Q postoperative anatomical—TVL	HUSLS	43	8.16	1.252	0.191	-1.443	0.153
	McCall	42	8.50	0.862	0.133		
POP-Q postoperative anatomical—PB	HUSLS	43	3.57	0.483	0.074	-1.301	0.197
	McCall	42	3.70	0.456	0.070		
POP-Q postoperative anatomical—D	HUSLS	42	-6.05	2.971	0.458	0.335	0.739
	McCall	42	-6.24	2.184	0.337		
POP-Q postoperative anatomical—Gh	HUSLS	43	4.93	0.258	0.039	-0.994	0.323
	McCall	42	4.98	0.154	0.024		

AaBa: Anterior points on vaginal wall; ApBp: Points on posterior vaginal wall; C: Cervix; D: Pouch of douglas; TVL: Total vaginal length; Pb: Perineal body; Gh: Genital hiatus

In HUSLS, while passing the sutures, control is required more at entry point than at exit, and sutures should always be taken from lateral to medial to avoid injury to ureters.

Table 5 shows the functional improvement in both groups (HUSLS/McCall). Thus functional improvement was seen in 62.79% of women after HUSLS as compared with 59.52% women after McCall’s culdoplasty.

Anatomical success for HUSLS was 95% as compared with 85% by McCall’s culdoplasty. Women complained of dyspareunia after McCall’s culdoplasty (2/42, 4.8%).

DISCUSSION

The primary aims of surgical treatment in women with POP are restoration of normal vaginal anatomy, improvement in vaginal bulge symptoms, and the restoration/maintenance of normal bladder, bowel, and sexual function. Most of the studies in the literature, however, have used the anatomical outcome as the primary outcome, with POP-Q stages 1 or 0 defined as the anatomical cure. A recent qualitative study based on patient interviews showed that women are most affected by the actual



Table 5: Functional improvement in both groups (HUSLS/McCall)

			Vault suspension	
			HUSLS	McCall
Functional improvement—yes/no	N	Count	16	17
		% within functional improvement—yes/no	31.21	40.48
	Y	Count	27	25
		% within functional improvement—yes/no	62.79	59.52
Total	Count	43	42	

physical symptoms of prolapse (bulge, pain, and bowel problems) as well as by the impact that prolapse has on their sexual life.

Uterus and apical part of vagina remain above the pelvic floor due to lots of supports. Loss of these supports results in POP.

High uterosacral ligament suspension allows vaginal repair of all defects. (The pubovesicocervical fascia, the rectovaginal fascia is tagged to uterosacral along with apex and the transverse defects too are corrected.) The apex is supported bilaterally and normal axis is restored which prevents the recurrence of POP. The anatomical success rate of HUSLS in the literature is 77 to 99% after mean follow-up of 13 to 33 months and 89% women show resolution of prolapse symptoms and express satisfaction with the procedure.

Apart from routine or common complications, the incidence of ureteric injuries is 1 to 11%, so a cystoscopy is a must after every HUSLS.

Uterosacral ligaments are palpable posterior portions of the cardinal uterosacral ligament complex at S2, S3 level, and comprises small vessels, nerves, connective tissue, and smooth muscles. Uterosacral ligaments support cervix, vagina and form an important endopelvic suspensory support true to uterus and vagina.

Ureters are anterolateral to uterosacrals and during their course they converge toward vagina.

As per Jerome Buller et al,⁵ ureters are 0.9 cm from vagina, 2.3 cm in intermediate portion, and 4.1 cm in

sacral portion of uterosacral ligaments. So one needs to remain 2 cm cephalic to ischial spines while taking sutures in HUSLS.

In a systematic review and meta-analysis⁶ of transvaginal uterosacral ligament suspension, the anterior, apical, and posterior compartments were successfully treated in 81.2, 98.3, and 87.4% respectively. The outcome of subjective symptoms was reassuring; however, it was not possible to pool data because of methodological differences between studies.

It was in 1957, the McCall culdoplasty was described,⁷ in which the uterosacral ligaments are plicated in the midline, incorporating the cul-de-sac peritoneum and posterior vaginal cuff. This obliterates the peritoneum of the posterior cul-de-sac and elevates the vault toward the plicated uterosacral ligaments. Several adaptations of this procedure have been described using different numbers of sutures and different points of fixation. McCall's culdoplasty may be performed at the time of vaginal hysterectomy for nonprolapse-related disease to reduce the risk of postoperative apical prolapse for up to 3 years. It is a comparatively easy procedure, requires less time, and has no complications associated with it. The sutures are placed through each uterosacral ligament, approximately 2 cm from the pelvic sidewall.

Table 6 shows comparison of our study with other studies for HUSLS. The success percentage of high uterosacral is 95% anatomical and 62.79% functional, which is comparable with all the studies.

CONCLUSION

High uterosacral ligament suspension provides excellent suspensory support to vaginal wall. Vagina is suspended over the levator ani with normal axis toward sacrum. By doing HUSLS, the vagina is symmetrically supported, directed toward the hollow of sacrum.

High uterosacral ligament suspension is highly recommended for young women with POP as vaginal length is not altered at all and so is the quality of life. High uterosacral ligament vaginal vault suspension with fascial reconstruction would seem to provide a durable

Table 6: Comparison of our study with other studies for HUSLS

Author	Number of patients	Follow-up (months)	Anatomic success (%)	Recurrence	Reoperation
Jenkins ⁸	50	6–48	96	4% ant	None
Comitar et al ⁹	100	17	96	4% apex	4%
Barber et al ¹⁰	46	15.5	90	5% apex	6.5%
Karram et al ¹¹	168	21.6	88	1% apex	5.5%
Shull et al ¹²	289	Not stated	95	1% apex	None
Amundsen et al ¹³	33	28	82	6% apex/12% post	None
Silva et al ¹⁴	72	61.2	85	3% apex/14% post	3%
Our study	43	6	Anatomic—95 Functional—62.79	4.65% apex	2 required laparotomy for ureteric kinking

anatomic repair with good functional improvement in patients with significant complex uterine or vaginal vault prolapse.

High uterosacral ligament suspension with fascial reconstruction seems to be a safe, minimal traumatic, tolerable, and highly successful procedure for vaginal repair of advanced uterine prolapse. Because of the use of native tissue as suspension site, HUSLS is more physiologic and cost-effective.

But all these advantages of HUSLS over McCall's culdoplasty are at the cost of statistical increased operating time, increased blood loss, and increased ureteric complications.

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