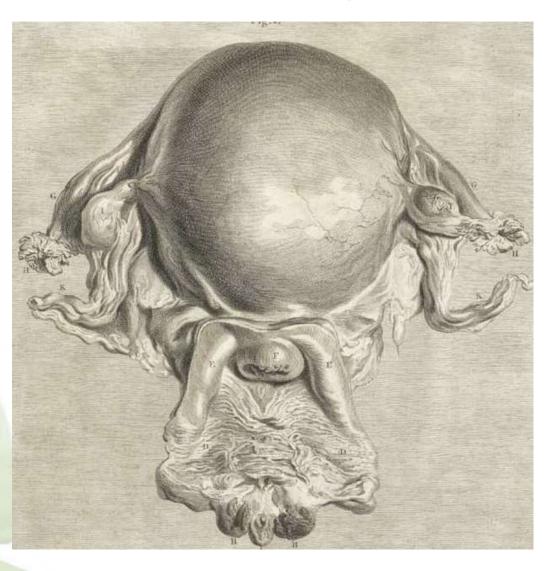


## Cervical Incompetence Current Concepts

Professor James Walker
Obstetrics and Gynaecology



## Muscle and Gristle



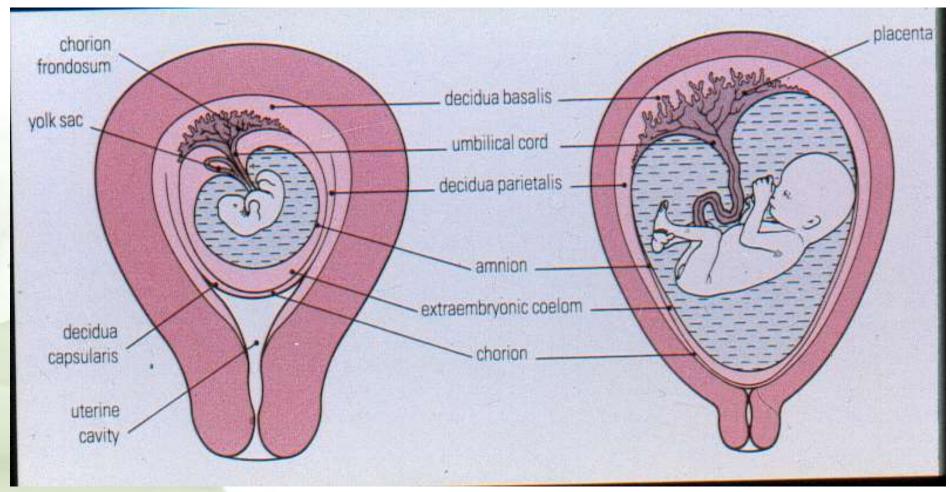


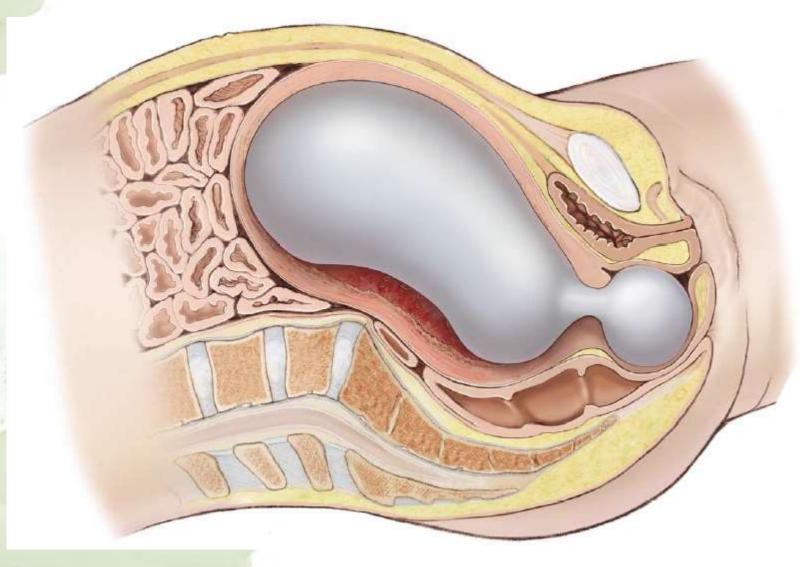
# What is the problem and is there a need for abdominal cerclage?

- Cervix is the purse string keeping the cervix closed
- During pregnancy it keeps closed under pressure
- At term it allows itself to be opened under pressure



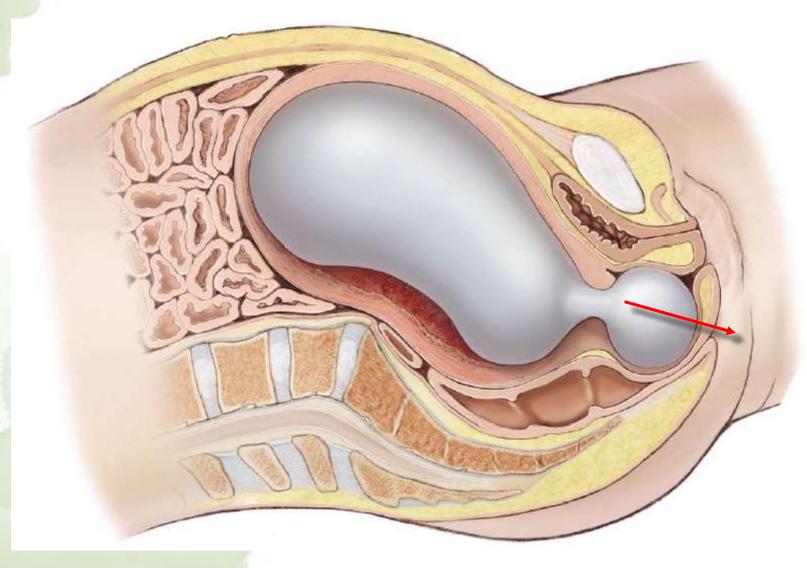
## Problem of mid pregnancy





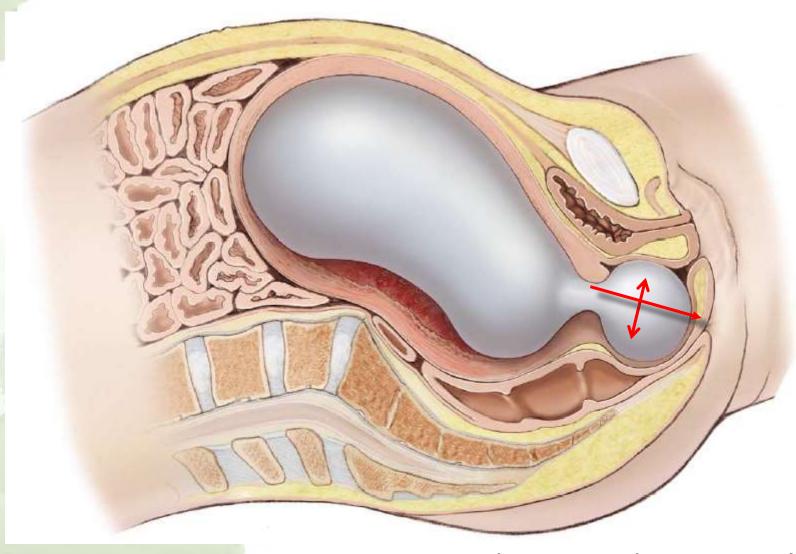
Harger JH *Obstet Gynecol* 100:1313-27 (2002)





Harger JH *Obstet Gynecol* 100:1313-27 (2002)





Harger JH *Obstet Gynecol* 100:1313-27 (2002)





## Cervical Incompetence

- Incidence 0.1% to 1%
- Responsible for 15% of recurrent Mid- Trimester Loss
- Diagnosis and Management Controversial

## Cervical Cerclage

Tracheloraphy was first described by Emmet in 1862

Shirodkar VN 1955 VC

□ Antiseptic J 52:299-300

■ McDonald I 1957 VC

☐ J Obstet Gyaecol Br Emp 64:346-350

Benson RC & Durfee RB 1965 TAC

□ Obstet Gynecol 25:145-155



#### Introduction

- Various approaches
  - □ Transcervical
    - McDonald, Shirodkar
    - Cervical Occlusion
    - Arabin pessary
  - □ Transabdominal
    - Benson and Durfee
  - □ Recent Advances
    - Laparoscopic approach pre-pregnancy



#### Introduction

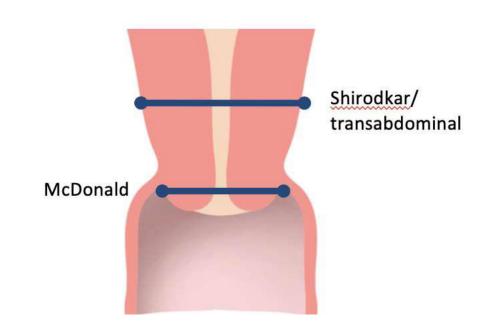
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    - McDonald, Shirodkar
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  - □ Transabdominal
    - Benson and Durfee
  - □ Recent Advances
    - Laparoscopic approach pre-pregnancy



## Cerclage – Type and Timing

#### Cerclage

- Techniques
  - Shirodkar
  - McDonald
  - Transabdominal
- Timing
  - Elective
  - USS-indicated
  - Emergency





## McDonald's Cervical Cerclage

- MRC/RCOG Trial (1993)
  - Weak statistical benefit for Del <33 weeks</p>
    - cerclage group (83 (13%) compared with 110 (17%), P = 0.03)
- Problems
  - Diagnosis
  - Placing of suture
  - □ Sepsis



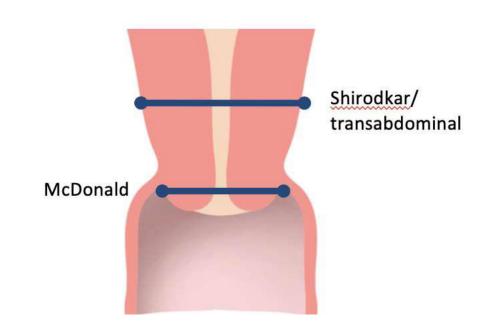
## **Associated Infection**



## Cerclage – Type and Timing

#### Cerclage

- Techniques
  - Shirodkar
  - McDonald
  - Transabdominal
- Timing
  - Elective
  - USS-indicated
  - Emergency





# Transabdominal Cervico-isthmic Cerclage

- Indications
- Failed Vaginal cerclage (65%)
- Cone biopsy
- Cervical amputation
- Scarred cervix
- Short cervix
- Low cervical resistance



#### Cervical Resistance Studies

- A novel cervical dilatation force measurement instrument.
  - J Med Eng Technol 1989 13):220-221
  - □ Richardson W, Smith DC, Evans AL, Anthony GS
- A simple and robust instrument for cervical dilatation force measurement which measures axial insertion force but is not affected by lateral loads. The instrument is battery-powered, self-contained and displays actual axial force and peak axial force on digital liquid crystal displays.
- Cervical resistance in patients with previous spontaneous mid-trimester abortion.
  - Anthony GS, Calder AA, MacNaughton MC
  - □ Br J Obstet Gynaecol 1982 Dec;89(12):1046-1049



## Management of cervical weakness based on the measurement of cervical resistance index

George S. Anthony <sup>a,\*</sup>, Robert G. Walker <sup>b</sup>, James B. Robins <sup>a</sup>, Alan D. Cameron <sup>c</sup>, Andrew A. Calder <sup>d</sup>

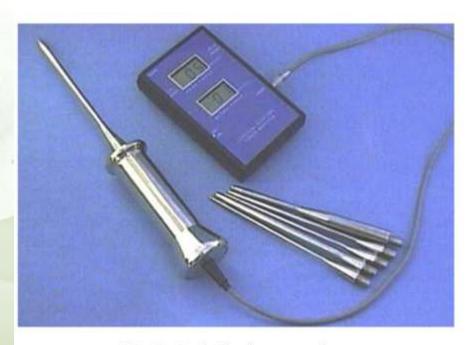


Fig. 1. Cervical resistance monitor.

Control vs. study group: age, CRI and pregnancy outcomes

	Study group $(n = 175)$	Control group $(n = 123)$
Maternal age (years) mean and range	28.85 (17-40)	39.9 (15–52)*
CRI (Newtons) mean and IQR	24.17 (4.5–34)	46.69 (21.4–64.9)**
Unsuccessful pregnancies	353	41
- 1st trimester loss	97	41
- 2nd trimester loss	256	0
- 3rd trimester loss	0	0
Live births	133	351
Total pregnancies	486	392
Successful outcome (%)	27.4	89.5

<sup>\*</sup> p < 0.001 Chi-squared test.</p>



p < 0.0001 Mann–Whitney *U*-test.

#### Association between CRI measurement and history

History	CRI			
	Incompetent	Competen	t	
Incompetent	73	30	103	
Competent	32	40	72	
Total	105	70	175	

Yates corrected  $\chi^2$  statistic 11.26: p = 0.0008. Relative risk = 1.59 (1.2 < RR < 2.12). Odds risk = 3.04 (1.55 < OR < 6.00).

#### **Subsequent Pregnancies**

250	1st Trimester	Midtrimester	· Premature	Term	LB	total
Incompetent		14	2	72	72	100
Competent	6	5	17	20	28	48



European Journal of Obstetrics & Gynecology and Reproductive Biology 72 (1997) 127-130



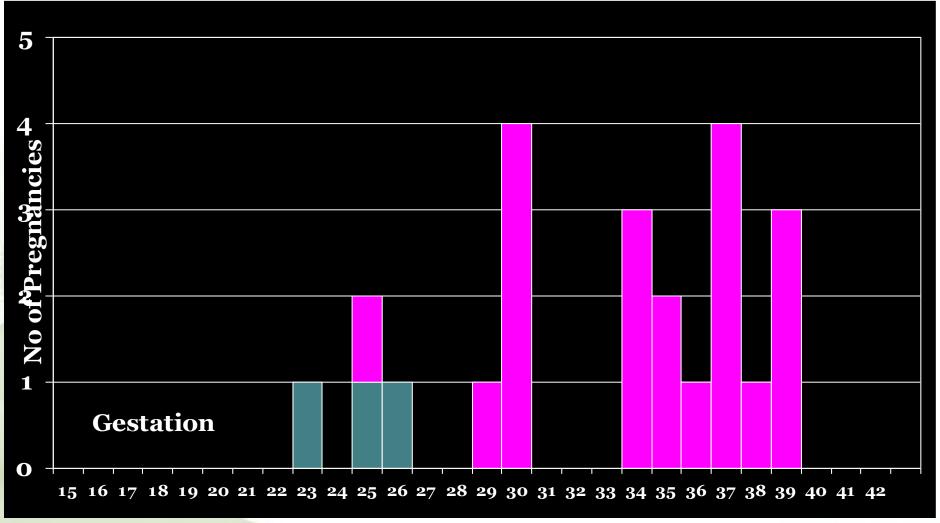
## Transabdominal cervico-isthmic cerclage in the management of cervical incompetence

George S. Anthony a.\*, Robert G. Walker a, Alan D. Cameron b, John L. Price c, James J. Walker d, Andrew A. Calder e

The use of transabdominal cervico-isthmic cerclage is described in 13 patients with a diagnosis of cervical incompetence. The patients were recruited from seven Scottish Maternity Units over a period of 10 years. The 13 patients have had a successful pregnancy in 86.6% of pregnancies with this procedure compared with a success rate of 16% in their previous pregnancies. In carefully selected cases transabdominal cervico-isthmic cerclage is a worthwhile procedure in patients with cervical incompetence when the cervix is so damaged that it would be impossible to insert a vaginal suture or when a vaginal suture has previously failed.



#### Post TAC Gestation



#### TRANSABDOMINAL CERVICO-ISTHMIC CERCLAGE

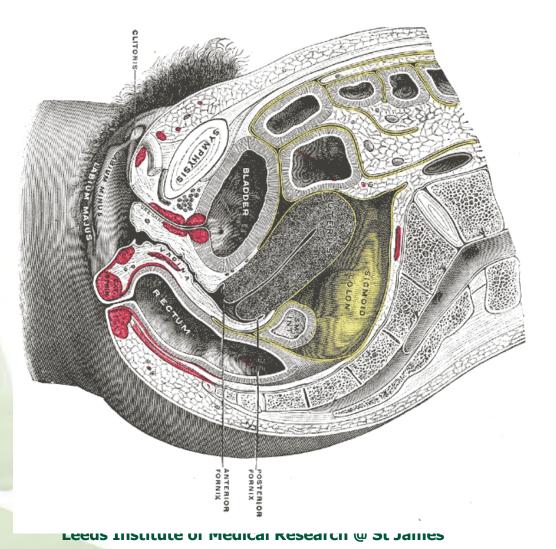
Year	Name	No	%PH	Preg	LB	00
2005	Walker	20	15	22	21	96
2003	Hole	13	_	13	10	77
2003	Groom	19	12	19	19	100
1998	Gibb	58	8	72	58	86
1998	Anthony	22	16	27	24	89
1997	Craig	12	13	14	10	71
1995	Cammarano	23	18	26	24	93
1995	Serrati	3	_	3	3	100
1991	van Dongen	16	36	16	15	96
1991	Novy	20	_	21	19	90
1991	Besio	6	_	6	5	83
1990	Borruto	54	_	48	43	90
1989	Lippi	2	_	2	2	100
1988	Herron	8	20	13	11	85
1987	Wallenburg	14	16	16	15	94
1982	Novy	16	24	22	21	95
1982	Olsen	32	12	35	32	91
1980	Loock	3	_	3	3	100
1978	Mahran	10	10	10	7	70
Tota	1	351	14	398	348	89%

#### Transabdominal Cervico-isthmic Cerclage

- Low transverse incision
- Enter abdominal cavity as normal
- Dissect down bladder from front of uterus
- Identify avascular space above the junction of the cervix and the uterine isthmus
- Insert a 5 mm wide Mersilene tape
- No dissection or tunnelling
- Tie suture at back of uterus
- Little operative blood loss

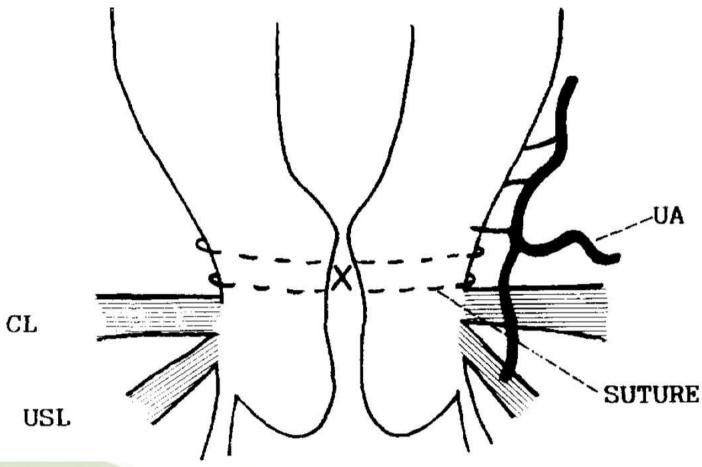


## Operative Approach





## Transabdominal/High Shirodkar



## Abdominal Cerclage - Back



## Abdominal Cerclage - front



Patients with a prior failed transvaginal cerclage: a comparison of obstetric outcomes with either transabdominal or transvaginal cerclage.

- □ Davis G, Berghella V, Talucci M, Wapner RJ.
- □ *Am J Obstet Gynecol* 2000;183(4):836-9.

Suture	Mid Trim	<33	<35
TAC	8%	10%	18%
■ TVC	29%	38%	42%

□ transabdominal cerclage is associated with a lower incidence of preterm delivery and preterm premature rupture of membranes in comparison with transvaginal cerclage.

## Is there a need for abdominal cerclage?

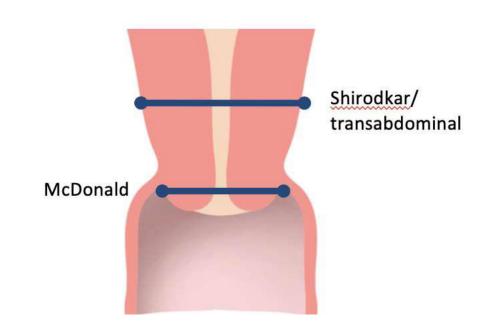
- Yes it works
  - Need training and experience
- Who for?
  - □ Previous failed TVC
  - □ Past history
    - Cervical damage
    - Short cervix



## Cerclage – Type and Timing

#### Cerclage

- Techniques
  - Shirodkar
  - McDonald
  - Transabdominal
- Timing
  - Elective
  - USS-indicated
  - Emergency

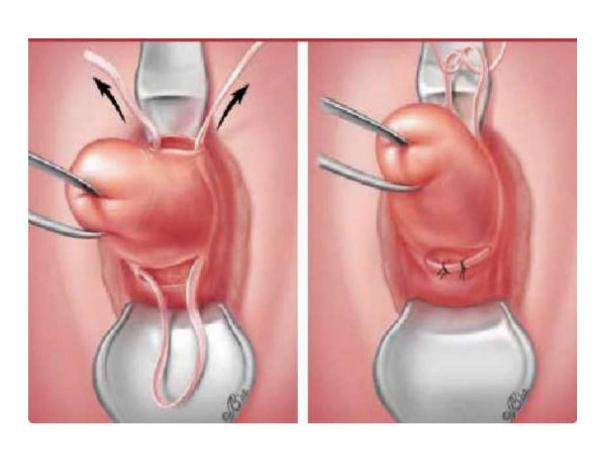




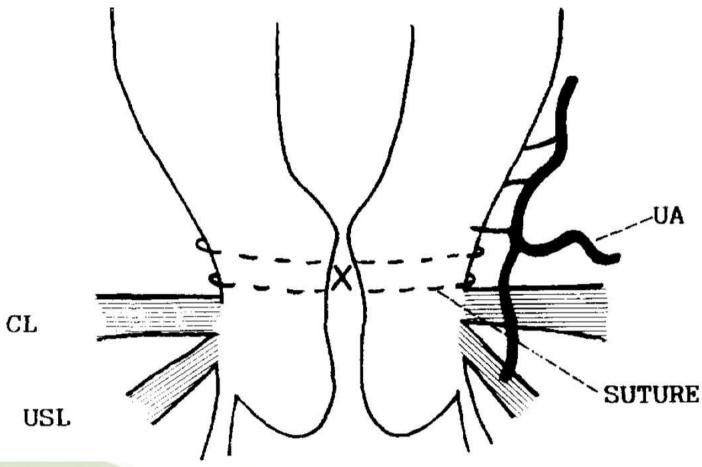
## Modified High Shirodkar Suture

#### The Shirodkar technique

- Regional anaesthetic
- Anterior and posterior colpotomies
- Bladder pushed high and Pouch of Douglas opened
- Mersilene tape used
- Knot tied anteriorly
- Knot buried with one long end left to aid removal



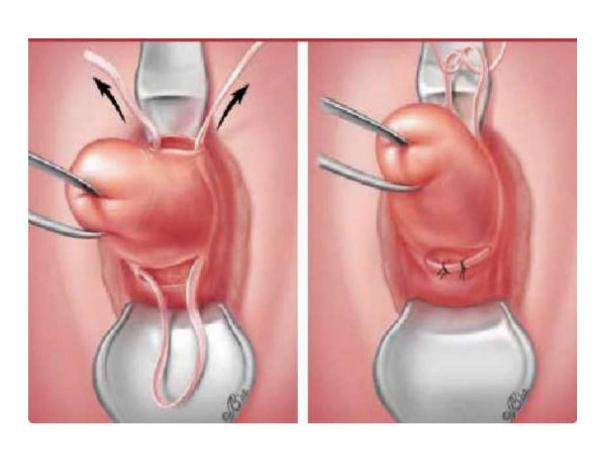
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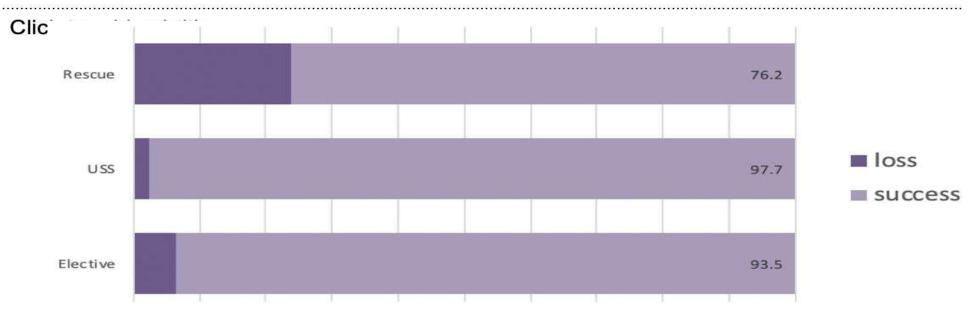
#### Methods

Retrospective review of 337 women who had Shirodkar sutures in Leeds between February 2005 and March 2016

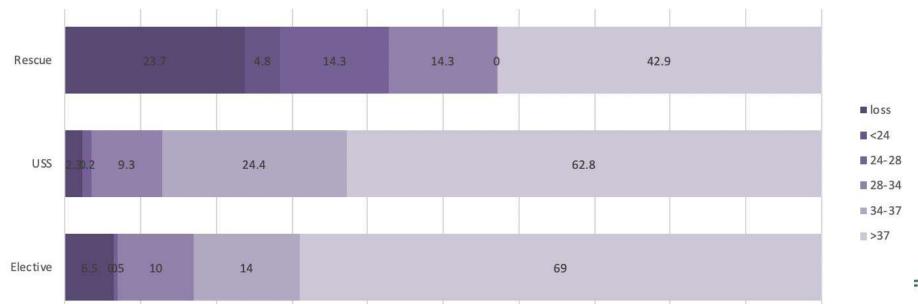
- Data was analysed by indication:
- Elective cerclage (n=230) was performed prior to 16 weeks in women with a recurrent history of mid-trimester loss or early preterm birth
- Ultrasound-indicated cerclage (n=86) was carried out in asymptomatic women where transvaginal ultrasound examination revealed a short cervix (<20mm) with or without collapse of the internal os
- Rescue cerclage (n=21) was undertaken where there were visible fetal membranes at the external cervical os or prolapsed within the upper vagina



#### **Outcomes**



#### **Gestation at delivery**





# Elective cerclage vs. ultrasound-indicated cerclage in high-risk pregnancies

- A total of 90 patients were examined,
  - □ 43 treated by elective cerclage.
  - □ 47 that were managed expectantly with US
    - 59.6% (28/47) required a cervical cerclage because of US changes
- Delivery before 34 weeks' gestation
  - □ 14.6% (6/41) in elective cerclage group,
  - □ 20.9% (9/43) in the expectant group
    - □ Ultrasound Obstet Gynecol, 2002. 19:475-7



#### Conclusions – Midtrimester loss

- Transvaginal cerclage is "safest"
  - Need to have some cervix present
  - In combination with Ultrasound
- Trans abdominal more successful
  - □ Failed vaginal suture
  - Badly scarred cervix
  - □ Very short cervix

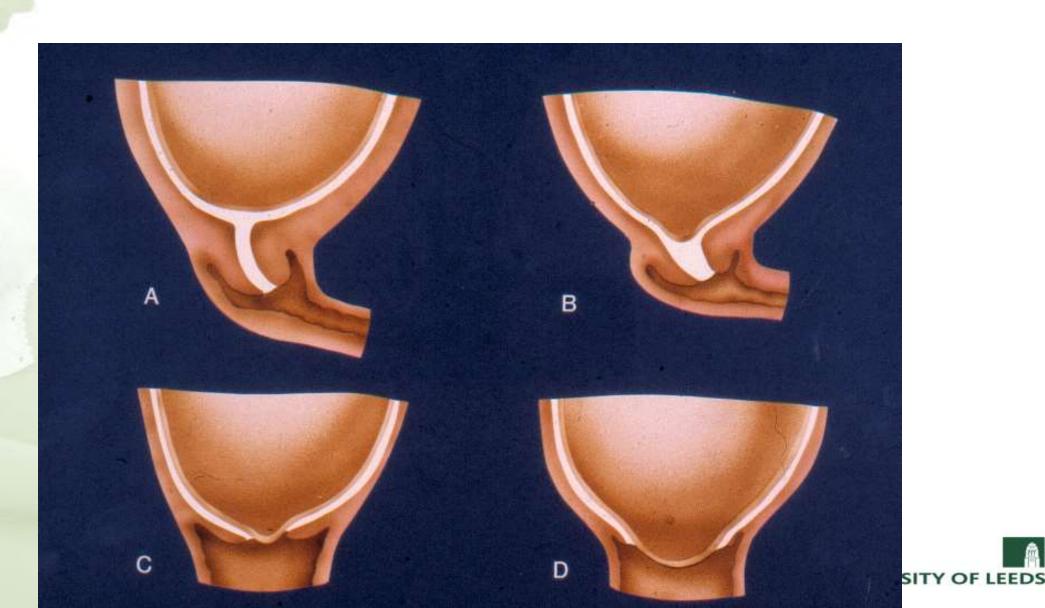


#### Preterm labour

#### What is the issue?

Cervical cerclage is a surgical procedure performed during pregnancy to place a stitch around the neck of the womb (cervix). The stitch is aimed to support the cervix and reduce risk of an early birth.

#### **Cervical Dilatation**



#### Cervical Weakness

- Progression in labour
  - □ Contractions
  - □ Cervical strength/weakness
- Treatment
  - □ Progesterone
  - □ Cervical cerclage



Comparison: 1 Cerdage versus no oerdage Outcome: 8 Preterm birth before 34 completed weeks No ordage Risk Rato Weight Risk Ratio Study or subgroup Cerdage M-H, Random, 95% CI M-H, Random, 95% CI n/N n/N 1 History-indicated cerdage vs no cerdage 0/39 11/42 + 0.05 [ 0.00, 0.77 ] Ezechi 2004 0.3 % MRC/ROOG 1993 92/635 113/629 36.0 % 0.81 [ 0.63, 1.04 ] Rush 1964 14/96 14/98 4.9% 1.02 [ 0.51, 2.03 ] Subtotal (95% CI) 770 769 41.1% 0.76[0.40, 1.46] Total events: 106 (Cerdage), 138 (No cerdage) Heterogeneity: Tau2 = 0.17; Chi2 = 4.66, d1 = 2 (P = 0.10); I2 = 57% Test for overall effect: Z = 0.81 (P = 0.42) 2 One off ultrasound indicated ordage in high risk for PTL vs no ordage To 2004 3.2% 0.63 [ 0.27, 1.48 ] Subtotal (95% CI) 26 30 3.2% 0.63 [ 0.27, 1.46 ] Total events: 6 (Cerdage), 11 (No cerdage) Heterogeneity: not applicable Test for overall effect: Z = 1.07 (P = 0.28) 3 Serial ultrasound-indicated cerdage in high risk for PTL vs no cerdage Althuisius 2001 0.3 % 0.08 [ 0.00, 0.92 ] Berghella 2004 10/25 11/22 5.6 % 0.80 [ 0.42, 1.51 ] Owen 2009 42/148 57/153 21.2% 0.76 [ 0.55, 1.06 ] Rust 2000 13/61 15'66 5.3 % 0.94 [ 0.49, 1.81 ] 253 32.5% Subtotal (95% CI) 257 0.77 [ 0.55, 1.10 ] Total events: 65 (Cerdage), 90 (No cerdage) Heterogeneity: Tau= = 0.03; Chi= = 3.92, df = 3 (P = 0.27); I= =23% Test for overall effect: Z = 1.42 (P = 0.15) 4 Physical examindicated cerdage in high risk for PTL vs no cerdage Althuisius 2003 10/10 9.0% 0.56 [ 0.34, 0.93 ] 13 10 9.0% 0.56[0.34, 0.93] Subtotal (95% CI) Total events: 7 (Cerdage), 10 (No oerdage) Heterogeneity: not applicable Test for overall effect: Z = 2.24 (P = 0.025) 5 One off ultrasound indicated ordage in low/unspecified risk for PTL vs no ordage 0.67 [ 0.03, 12.96 ] Berghella 2004 0/3 0.3 % Rust 2000 11/43 12/37 4.8 % 0.79 [ 0.40, 1.57 ] To 2004 22/101 25/98 9.1% 0.84 [ 0.51, 1.38 ] Subtotal (95% CI) 147 140 14.2% 0.82 [ 0.55, 1.22 ] Total events: 33 (Cerdage), 38 (No cerdage) Heterogeneity: Tau= = 0.0; Chi= = 0.04, d1 = 2 (P = 0.96); I= =0.0% Test for overall effect: Z = 0.99 (P = 0.32) 1209 1206 100.0% 0.77 [ 0.66, 0.89] Total (95% CI) Total events: 217 (Cerdage), 267 (No ordage) Heterogeneity: Tau= = 0.0; Chi= = 10.31, df = 11 (P = 0.50); P = 0.0% Test for overall effect: Z = 3.41 (P = 0.00065) Test for subgroup differences: Chi<sup>2</sup> = 1.59, dt = 4 (P = 0.81), I<sup>2</sup> =0.0% 0.01 0.1 10 100 OF LEEDS Favours ordage Favours no ordage

Review: Cervical aftch (cerdage) for preventing preterm birth in singleton pregnancy

Comparison: 1 Cerdage versus no oerdage Outcome: 8 Preterm birth before 34 completed weeks No ordage Risk Rato Weight Risk Ratio Study or subgroup Cerdage M-H, Random, 95% CI M-H, Random, 95% CI n/N n/N 1 History-indicated cerdage vs no cerdage 11/42 + 0.05 [ 0.00, 0.77 ] Ezechi 2004 0/39 0.3 % MRC/ROOG 1993 92/635 113/629 36.0 % 0.81 [ 0.63, 1.04 ] Rush 1964 14/96 14/98 4.9% 1.02 [ 0.51, 2.03 ] Subtotal (95% CI) 770 769 41.1% 0.76[0.40, 1.46] Total events: 106 (Cerdage), 138 (No cerdage) Heterogeneity: Tau2 = 0.17; Chi2 = 4.66, d1 = 2 (P = 0.10); I2 = 57% Test for overall effect: Z = 0.81 (P = 0.42) 2 One off ultrasound indicated ordage in high risk for PTL vs no ordage To 2004 3.2% 0.63 [ 0.27, 1.46 ] Subtotal (95% CI) 26 30 3.2% 0.63 [ 0.27, 1.46 ] Total events: 6 (Cerdage), 11 (No cerdage) Heterogeneity: not applicable Test for overall effect: Z = 1.07 (P = 0.28) 3 Serial ultrasound-indicated cerdage in high risk for PTL vs no cerdage Althuisius 2001 0.3 % 0.08 [ 0.00, 0.92 ] Berghella 2004 10/25 11/22 5.6 % 0.80 [ 0.42, 1.51 ] Owen 2009 42/148 57/153 21.2% 0.76 [ 0.55, 1.06 ] Rust 2000 13/61 15'66 5.3 % 0.94 [ 0.49, 1.81 ] 253 32.5% Subtotal (95% CI) 257 0.77 [ 0.55, 1.10 ] Total events: 65 (Cerdage), 90 (No cerdage) Heterogeneity: Tau= = 0.03; Chi= = 3.92, d1 = 3 (P = 0.27); I= =23% Test for overall effect: Z = 1.42 (P = 0.15) 4 Physical examindicated cerdage in high risk for PTL vs no cerdage Althuisius 2003 10/10 9.0% 0.56 [ 0.34, 0.93 ] 13 10 9.0% Subtotal (95% CI) 0.56 [ 0.34, 0.93 ] Total events: 7 (Cerdage), 10 (No cerdage) Heterogeneity: not applicable Test for overall effect: Z = 2.24 (P = 0.025) 5 One off ultrasound indicated ordage in low/unspecified risk for PTL vs no ordage Berghella 2004 0/3 0.3 % 0.67 [ 0.03, 12.96 ] Rust 2000 11/43 12/37 4.8 % 0.79 [ 0.40, 1.57 ] To 2004 22/101 9.1% 0.84 [ 0.51, 1.38 ] 25 98 Subtotal (95% CI) 147 140 14.2% 0.82 [ 0.55, 1.22 ] Total events: 33 (Cerdage), 38 (No cerdage) Heterogeneity: Tau= = 0.0; Chi= = 0.04, d1 = 2 (P = 0.96); I= =0.0% Test for overall effect: Z = 0.99 (P = 0.32) 1209 1206 100.0% 0.77 [ 0.66, 0.89 ] Total (95% CI) Total events: 217 (Cerdage), 287 (No cerdage) Heterogeneity: Tau2 = 0.0; Chi2 = 10.31, d1 = 11 (P = 0.50); I2 = 0.0% Test for overall effect: Z = 3.41 (P = 0.00065) Test for subgroup differences: Chi<sup>2</sup> = 1.59, d1 = 4 (P = 0.81), I<sup>2</sup> =0.0% LEEDS 0.01 0.1 10 100

Review: Cervical aftch (cerdage) for preventing preterm birth in singleton pregnancy

Comparison: 1 Cerdage versus no cerdage Outcome: 1 All perinatal losses No cerdage Risk Ratio Weight Risk Rato Study or subgroup Cerdage M-H, Fixed, 95% CI M-H. Fixed .95% CI n/N n/N 1 History-indicated oardage vs no cardage Lazar 1984 2/266 1/238 0.8% 1.78 [ 0.16, 19.46 ] Ezechi 2004 0/39 2/42 1.8 % 0.22 [ 0.01, 4.34 ] Rush 1984 9/96 96/98 6.6 % 1.02 [ 0.42, 2.46 ] MRC/ROOG 1993 53/635 66/629 49.3 % 0.80 [ 0.56, 1.12 ] Subtotal (95% CI) 1038 1007 58.4% 0.82[0.60, 1.12] Total events: 64 (Cerdage), 78 (No cerdage) Heterogeneity: Chi= = 1.43, d1 = 3 (P = 0.70); # =0.0% Test for overall effect: Z = 1.26 (P = 0.21) 2 One off ultrasound-indicated cerdage in high risk for PTL vs no cerdage To 2004 0.77 [ 0.14, 4.25 ] 2.1% 30 Subtotal (95% CI) 26 2.1% 0.77 [ 0.14, 4.25 ] Total events: 2 (Cerdage), 3 (No cerdage) Heterogeneity: not applicable Test for overall effect: Z = 0.30 (P = 0.76) 3 Serial ultrasound-indicated cerdage in high risk for PTL vs no cerdage Althuisius 2001 0/19 2.8% 0.12[0.01, 2.19] Berghella 2004 4/25 4/22 3.2 % 0.88 [ 0.25, 3.11 ] Rust 2000 7/61 5/66 3.6 % 1.51 [ 0.51, 4.52 ] Owen 2009 13/148 25/152 18.3 % 0.53 [ 0.26, 1.00 ] 256 27.9% Subtotal (95% CI) 253 0.66[0.41, 1.06] Total events: 24 (Cerdage), 37 (No cerdage) Heterogeneity: Chi2 = 4.17, d1 = 3 (P = 0.24); I2 = 28% Test for overall effect: Z = 1.72 (P = 0.085) 4 Physical exam indicated cerdage vs no cerdage Althuisius 2003 4/14 3.2% 1.97 [ 0.77, 5.01 ] Subtotal (95% CI) 16 14 3.2% 1.97 [ 0.77, 5.01 ] Total events: 9 (Cerdage), 4 (No oerdage) Heterogeneity: not applicable Test for overall effect: Z = 1.42 (P = 0.16) 5 One-off ultrasound-indicated cerdage in low/unspecified risk for PTL vs no cerdage Not estimable Berghella 2004 0/7 Rust 2000 5/43 2/37 1.6% 2.15 [ 0.44, 10.44 ] To 2004 7/101 9/96 6.9 % 0.74 [ 0.29, 1.91 ] Subtotal (95% CI) 147 140 8.5% 1.01 [ 0.46, 2.22 ] Total events: 12 (Cerdage), 11 (No cerdage) Heterogeneity: Chi2 = 1.30, d1 = 1 (P = 0.28); I2 = 23% Test for overall effect: Z = 0.01 (P = 0.99) 1480 1447 100.0 % 0.82[0.65, 1.04] Total (95% CI) Total events: 111 (Cerdage), 133 (No cerdage) Heterogeneity: Chi<sup>2</sup> = 10.95, d1 = 11 (P = 0.45); I<sup>2</sup> =0.0% Test for overall effect: Z = 1.60 (P = 0.11) Test for subgroup differences: Chi= = 4.44, df = 4 (P = 0.35), I= =10% OF LEEDS 0.002 10 500 0.1

Favours oardage

Favours no cerdage

Review: Cervical strich (cerdage) for preventing preterm birth in singleton pregnancy

## Can inserting a cervical stitch prevent early births of single babies?

#### **Authors' conclusions:**

Cervical cerclage reduces the risk of **preterm birth** in women at high-risk of preterm birth and **probably** reduces risk of perinatal deaths.

There was no evidence of any differential effect of cerclage based on previous obstetric history or short cervix indications, but data were limited for all clinical groups.

The question of whether cerclage is more or less effective than other preventative treatments, particularly vaginal progesterone, remains unanswered.

## Conclusions - Cervical Cerclage

- Early pregnancy loss <16 weeks No</p>
- Midtrimester loss 16-22 weeks yes
  - ☐ High Shirodkar
  - □ Transabdominal
- Premature labour >24 weeks maybe
  - In combination with Progesterone
- No role in twin/multiple pregnancy



# Keeping the mother and baby safe

