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Heilig Hart Leuven

Leuven Institute for
Fertility and Embryology

Oviductus, spermaductus, when the road is blocked - Female

What is defined as tubal factor infertility?

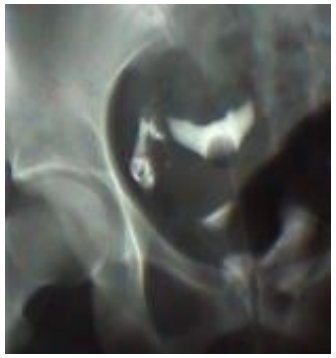
As tubal factor infertility is defined any change in the macroscopic or microscopic anatomy of the tubes that might have an effect in the functional role of the tubes in the conception process

- Ovum pick-up
- Fertilization
- Transportation of the embryo

Diagnosis

Indirect examination:

- HSG



Diagnosis

Indirect examination:

- HSG

- Hyfosy: foam
  - ultrasound
  - Less painfull

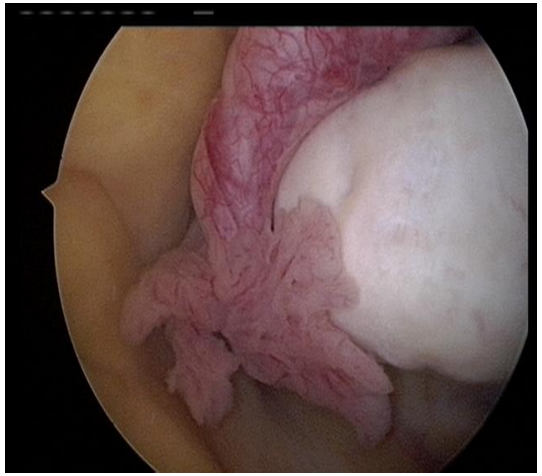
Diagnosis

Direct examination:

✓ Laparoscopy

✓ Transvaginal laparoscopy

- under sedation
- No scars
- In watery distention medium



IVF? Tubal surgery?

Fertil Steril. 2008 Jan;89(1):232-6. Epub 2007 May 16.

Infertility surgery is dead: only the obituary remains?

Feinberg EC[1], Levens ED, DeCherney AH.

Author information

Abstract

Despite the multiple advantages of assisted reproductive technology compared with surgery, there remain several diagnoses for which surgery is still widely performed: distal tubal occlusion, regret of permanent sterilization, and endometriosis. Assisted reproductive technology is superior to surgery and should be offered as first-line treatment.

Review Article

Redefining Reproductive Surgery

Togas Tulandi, MD, MHCM*, and Alicia Marzal, MD

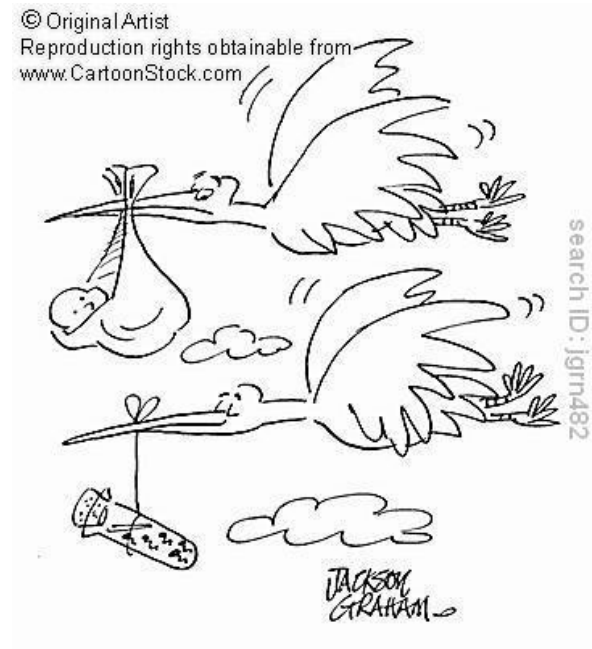
From the Department of Obstetrics and Gynecology, McGill University, Montreal, Quebec, Canada (Dr. Tulandi), and Department of Gynecology, Universitary Hospital La Fe, Valencia, Spain (Dr. Marzal).

ABSTRACT With the availability of and improvements in in vitro fertilization (IVF), the role of reproductive surgery has been questioned. Yet, the scope of reproductive surgery today is much larger than in the past. Hysteroscopic correction of intrauterine

Why surgery?

- Tubal surgery is justified if it produces better result

- Surgery can improve the results of IVF



Reproductive efficiency of human oocytes fertilized in vitro
Howard W. Jones, Sergio Oehninger, Bocca Silvina, Laurel Stadtmauer, Jacob Mayer
Facts, Views & Vision Obgyn, 2010,2 (3):169-171.

Conclusion:

On an egg to egg basis, IVF is about one-fifth as efficient as normal reproduction, which is itself quite inefficient.

TABLE 1

Oocyte to baby rate in patients without frozen embryos.

Age group	Number of Patients	Cycles	Oocytes	ET	FHB	LBB	FHB per Oocyte (%)	FHB per ET (%)	LBB per Oocyte (%)[a]	LBB per ET (%)
Donors	32	32	473 (14.8 ± 7.6)	78 (2.5 ± 0.7)	24	22	5.1	30.8	4.7[b]	28.2
<35	123	154	1948 (12.6 ± 7.3)	441 (3.0 ± 0.9)	81	71	4.2	18.4	3.6[b]	16.1
35–37	85	98	943 (9.6 ± 6.0)	257 (2.8 ± 0.8)	46	37	4.9	17.9	3.9[b]	14.4
38–40	70	92	777 (8.4 ± 6.5)	249 (3.0 ± 1.2)	21	20	2.7	8.4	2.6[b]	8.0
41–42	34	43	349 (8.1 ± 4.6)	129 (3.2 ± 1.3)	5	3	1.4	3.9	0.9[c]	2.3
>42	16	21	130 (6.2 ± 3.9)	49 (2.7 ± 1.1)	0	0	0.0	0.0	0.0[c]	0.0

Note: Numbers in parentheses are the mean + SD for the number of oocytes and embryos transferred. ET, total number of embryos transferred; FHB, total number of fetal heartbeats; LBB, total number of live babies born.

[a] Final expected LBB per oocyte in relation to age is significantly different: chi-square = 16.8, d.f.= 5, $P<.01$.

[b,c] Final expected LBB per oocyte in relation to age is not statistically significantly different for groups with the same letters.

Patrizio. Oocyte to baby rate and inefficiency of IVF. Fertil Steril 2008.

Pasquale & Sakkas, Fertil Steril 2008

Questions to be answered

Is there any impact of tubal factor infertility on IVF outcome?

Is there an indication of surgical treatment?

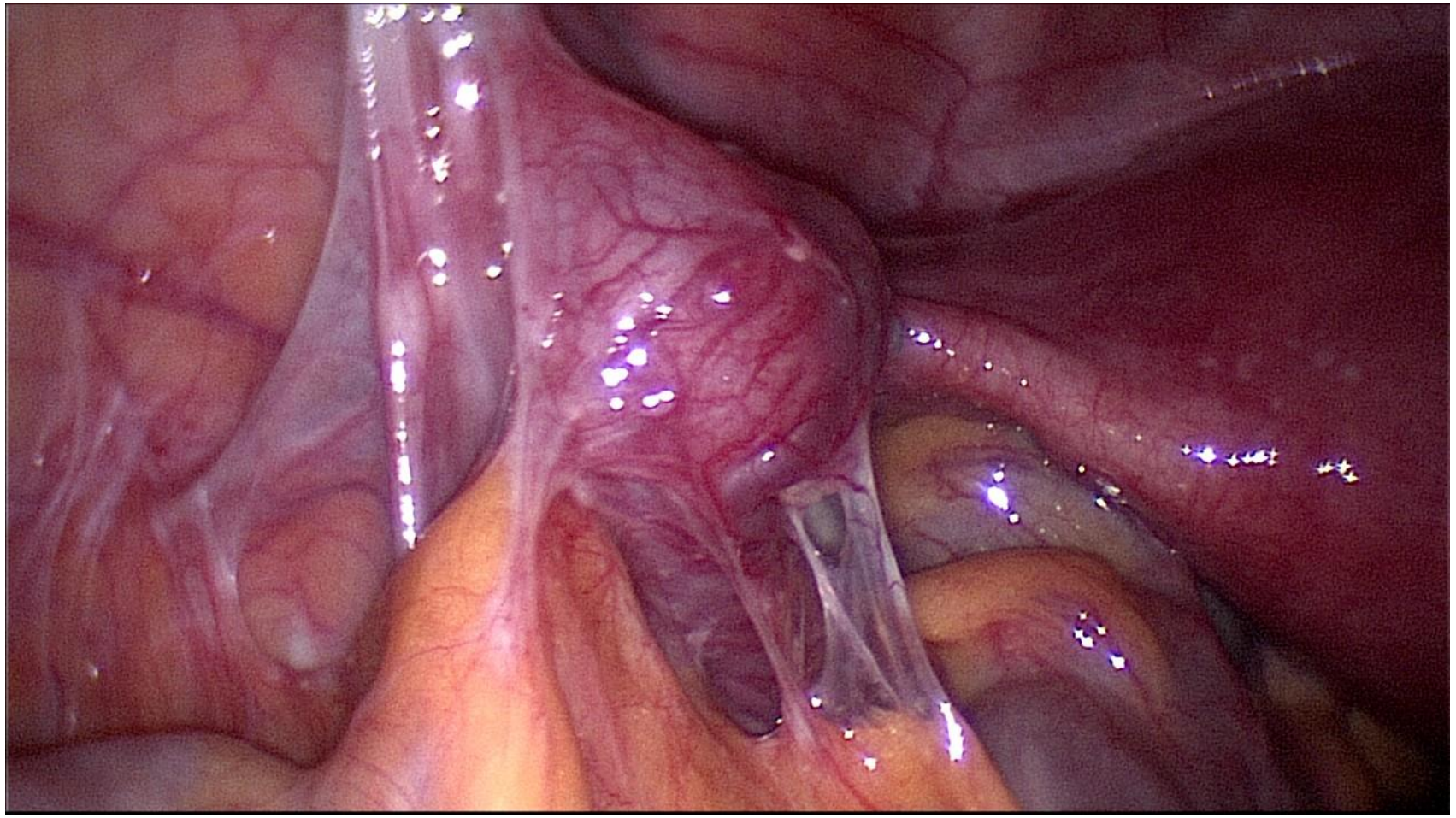
Are there different results depending on the type of tubal pathology?

Are there differences between the different types of surgical treatment options?

Tubal factor infertility

- Distal tubal occlusion
- Proximal tubal occlusion
- Subtle lesions

Distal occlusion: Hydrosalpinx



Pregnancy rates after IVF in cases of tubal infertility with and without hydrosalpinx: a meta-analysis

Table VI. Meta-analysis

Outcome criteria	Group with hydrosalpinx (%)	Group without hydrosalpinx (%)	Odds ratio	Confidence interval
Pregnancy rate	19.67	31.2	0.64	0.56–0.74[a]
Implantation rate	8.53	13.68	0.63	0.55–0.72[a]
Delivery rate	13.4	23.44	0.58	0.49–0.69[a]
Early pregnancy loss rate	43.65	31.11	1.72	1.34–2.20[a]

[a]Odds ratio significantly different from 1 ($P < 0.05$).

Camus et al, Hum Reprod, 20: 722-727, 2005

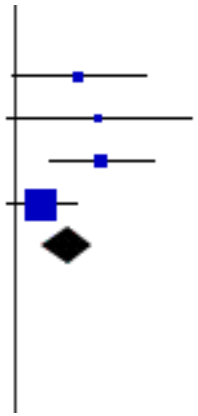
Salpingectomy

5.1.3 Pregnancy rate - any definition

Dechaud 1998	13	30	6	30	12.9%	3.06 [0.97, 9.66]
Kontoravdis 2006	20	50	2	15	7.0%	4.33 [0.88, 21.30]
Moshin 2006	23	60	8	66	17.8%	4.51 [1.82, 11.13]
Strandell 1999	40	116	22	88	62.2%	1.58 [0.85, 2.92]
Subtotal (95% CI)		**256**		**199**	**100.0%**	**2.49 [1.60, 3.86]**
Total events	96		38			

Heterogeneity: $Chi^2 = 4.34$, $df = 3$ ($P = 0.23$); $I^2 = 31\%$

Test for overall effect: $Z = 4.06$ ($P < 0.0001$)

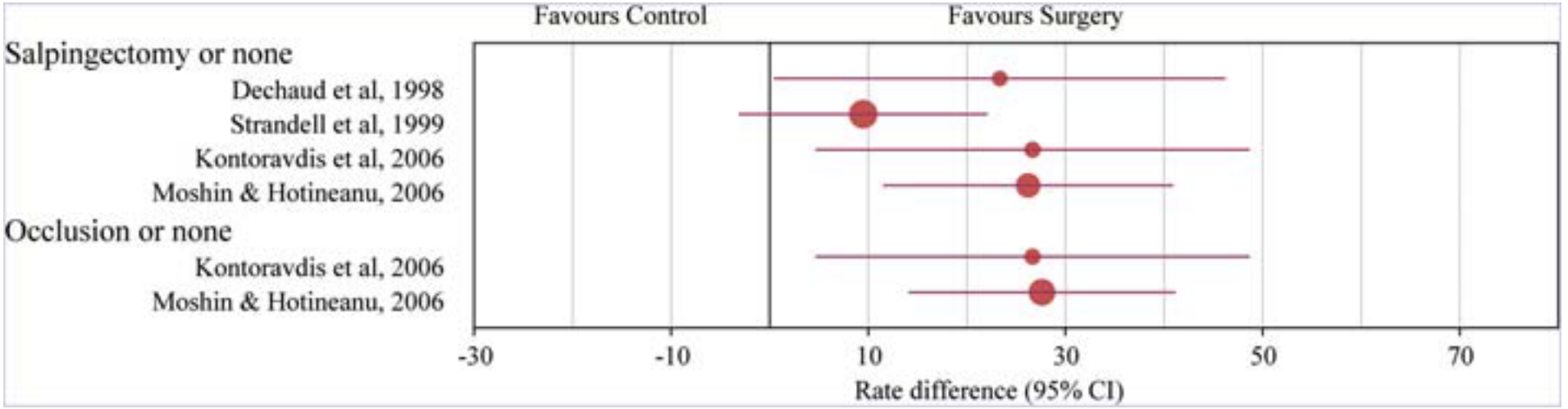


The effectiveness of laparoscopic salpingectomy, in terms of ongoing pregnancy and clinical pregnancy, is supported strongly by the existing evidence

The ongoing pregnancy rates in the intervention and control group were 31% and 17.6%

Johnson et al, Cochrane Database Systematic Reviews, 2010, Issue 1, Art No: CD002125

Tubal surgery before IVF: salpingectomy versus proximal occlusion

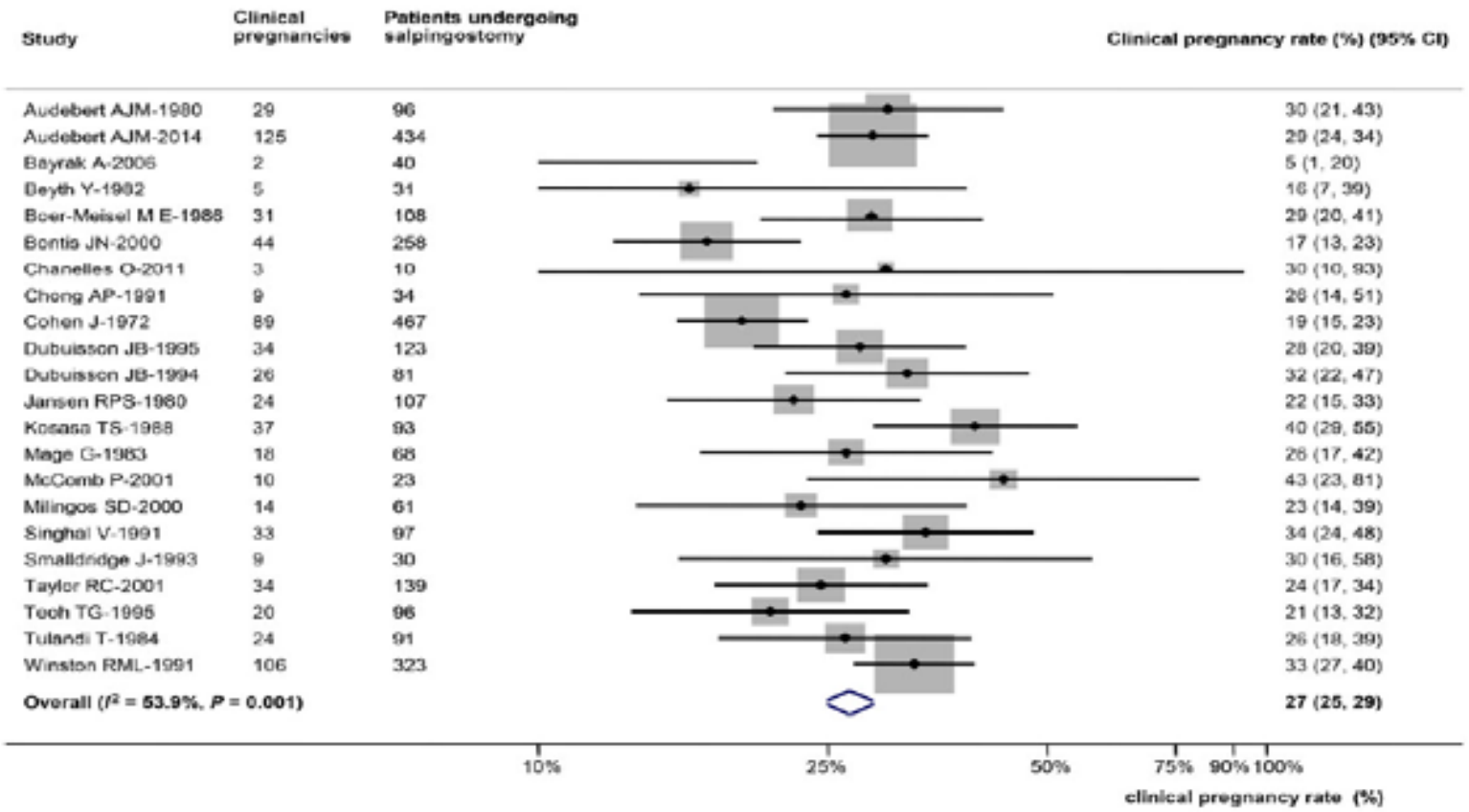


The presence of hydrosalpinges is an indication for surgical treatment before IVF

Salpingectomy and occlusion give similar results

Johnson et al, Hum Reprod Update, 17: 1, 2011

Salpingostomy in the treatment of hydrosalpinx



Overall 27% natural pregnancy and 25% live birth rates after salpingostomy treatment for hydrosalpinx

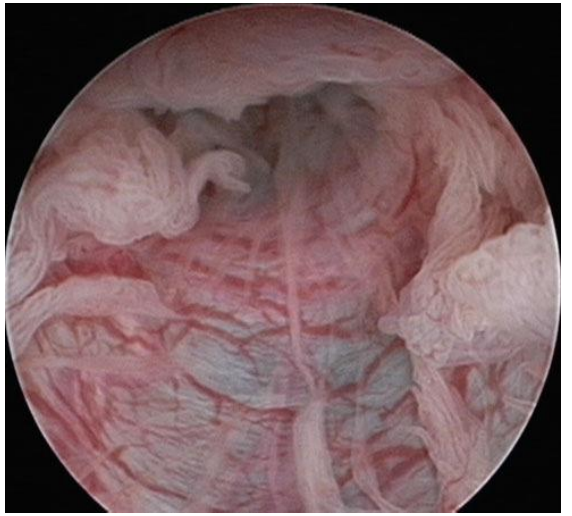
Chu et al, Hum Reprod, 30: 1882-1895, 2015

Laparoscopic surgery for distal tubal occlusions
The effect of tubal pathology and adhesions stage

Delivery and EP rates according to peroperative parameters.

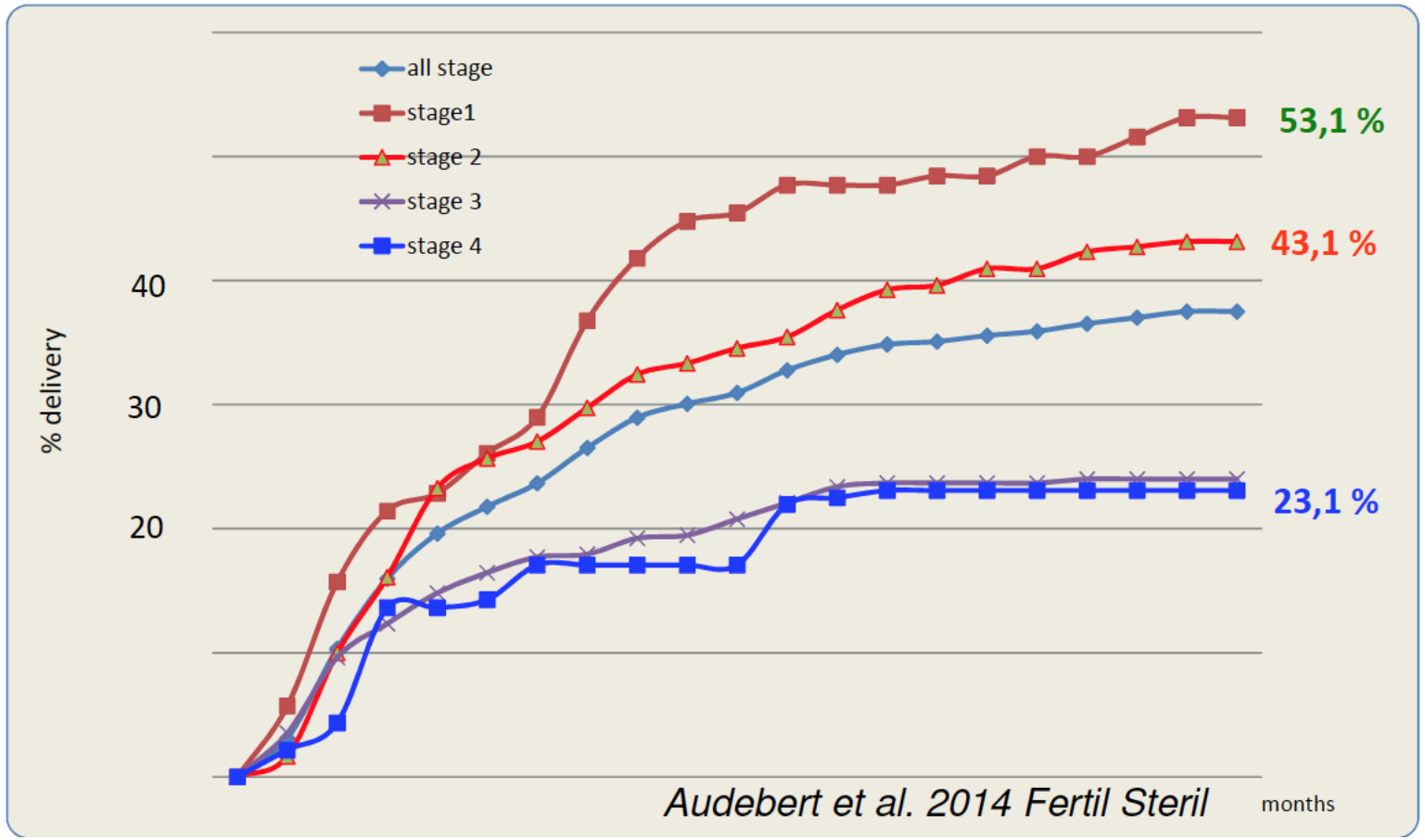
Parameter/class	n	% IUP	*P* value	% EP	*P* value
Tubal stage			.021		.96
Stage 1	100	43		9	
Stage 2	146	33.6		11	
Stage 3	123	19.5		11.4	
Stage 4	65	13.8		6.2	
Adhesion stage			.26		.0004
No adhesions	27	37		3.7	
Stage 1	45	44.4		2.2	
Stage 2	103	26.2		10.7	
Stage 3	149	34.2		12.8	
Stage 4	110	15.5	.0002[a]	10	
Eversion technique			.07		.19
Laser	48	29.2		14.6	
Coagulation	219	25.1		11	
Suture	164	34,1		6.7	.068[b]
Endometriosis			.69		.56
Yes	28	32.1		7.1	
No	406	28.6		10.1	

[a] Stage 4 vs. the other stages.
[b] Suture vs. the other techniques.



Audebert et al, Fertil Steril, 102: 1203-1208, 2014

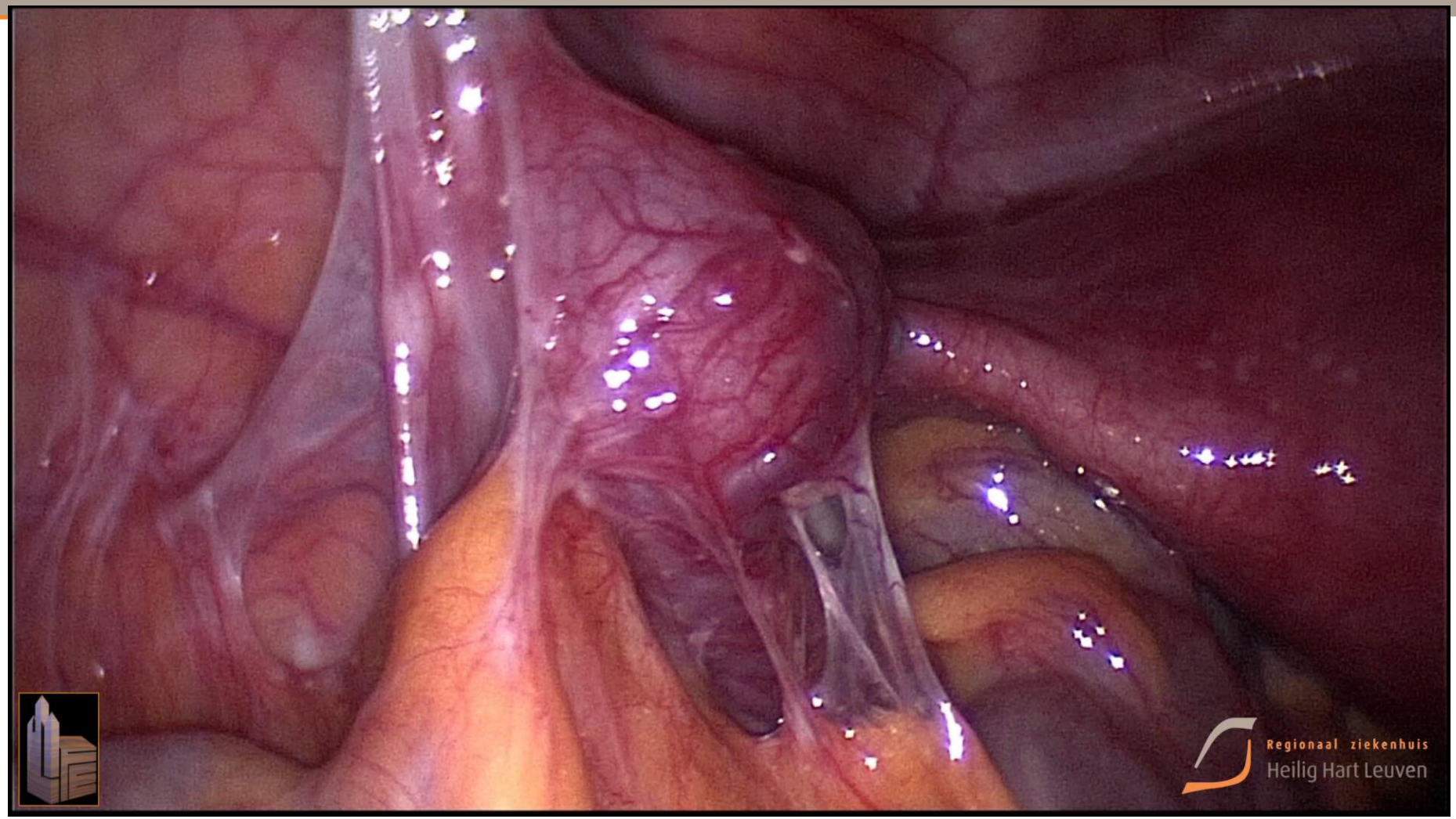
Tubal stage & delivery rates



The effect of tubal pathology and adhesions stage

Poor-prognosis patterns

- Tubal stage 3 (OR 0.24) - 4 (OR 0.28)
- Repeated salpingostomy (OR 0.168)
- Previous ectopic Pregnancy (OR 0.202)
- Severe adhesions (OR 0.211)
- Positive chlamydial serology (OR 0.515)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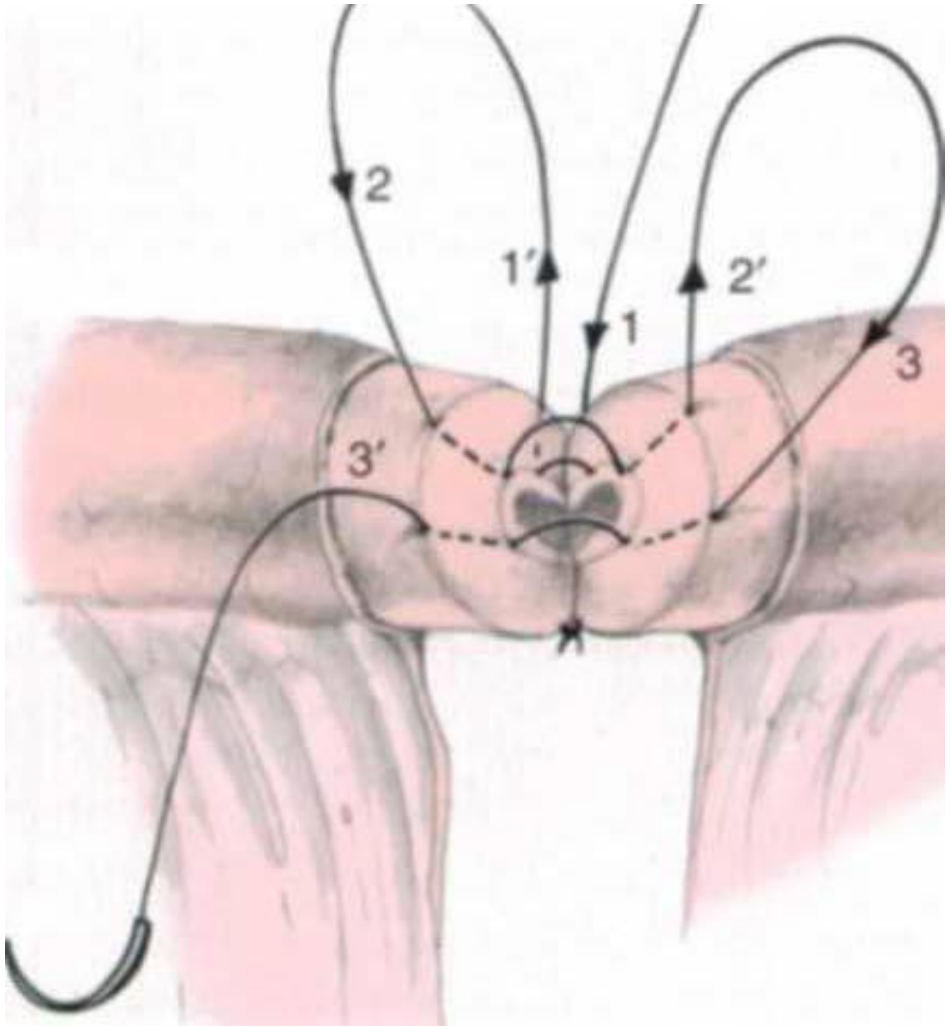
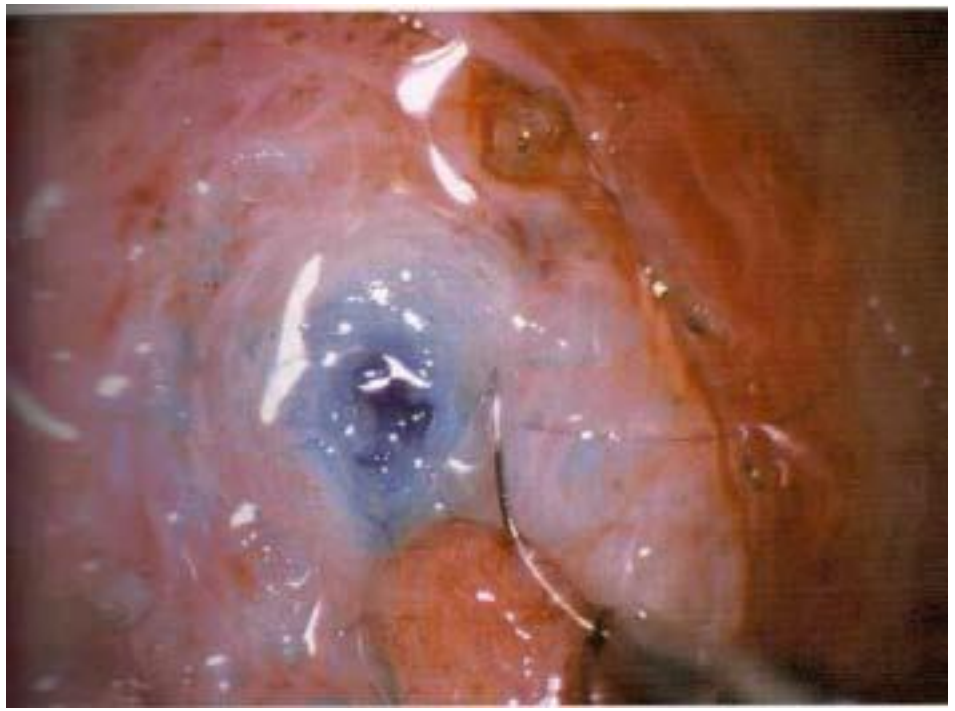
Proximal occlusion: after previous sterilization





Tubal anastomosis after previous sterilization

Author (year)	Patients	Mean age*	Pregnancy rate (%)	Ectopic pregnancy rate (%)	Method used	Follow-up
Macrosurgery						
Williams (1973)	10	34.8	0	0	N.M.	18 m
Siegler and Perez (1975)	23	16–38	17	5.8	N.M.	N.M.
McCormick and Torres (1976)	13	N.M.	61	7.6	1-sided, single layer	>1 yr
Hodari et al. (1977)	14	25	54	21	Two-layer	17 m
Total/pooled result	60		42	8.4		
Microsurgery						
Gomel (1977)	11	N.M.	72	9	Two-layer	>6 m
Diamond (1977)	16	N.M.	63	12.5	Two-layer	N.M.
Grunert et al. (1981)	40	29.7	55	2.5	Two-layer	>6 m
Spivak et al. (1986)	113	31.9	50	7	Two-layer	>1 yr
Dubuisson and Chapron (1998)	206	29 ± 5.7	70	2	Two-layer	18 m
Kim et al. (1997)	922	N.M.	50	5.1	Two-layer	>5 yr
Cha et al. (2001)	40	36.2 ± 4.1	78	2.5	N.M.	13 m
Hawkins et al. (2002)	40	33.8 ± 5.3	64	12	Two-layer	18 m
Hanafi (2003)	85	33.5 ± 4.8	75	7.1	Two-layer	1–5 yr
Wiegerinck et al. (2005)	41	34.5 ± 3.5	63	2.4	Clips/ biological glue	>2 yr
Biswas and Mondal (2006)	83	N.M.	66	3.6	N.M.	2 yr
Boeckxstaens et al. (2007)	84	35 ± 5	69	3.6	Two-layer	>14 m
Rodgers et al. (2007)	33	34.4	79	13	Two-layer	>10 m
Petrucco et al. (2007)	21	>40	40	0	Two-layer	>12 m
Gordts et al. (2009)	172	33.8 ± 4.8	72	7.7	Two-layer	2 yr
Dharia Patel et al. (2008)	10	33.3	50	10	Two-layer	1 yr

Pooled pregnancy rates: 42–69%,

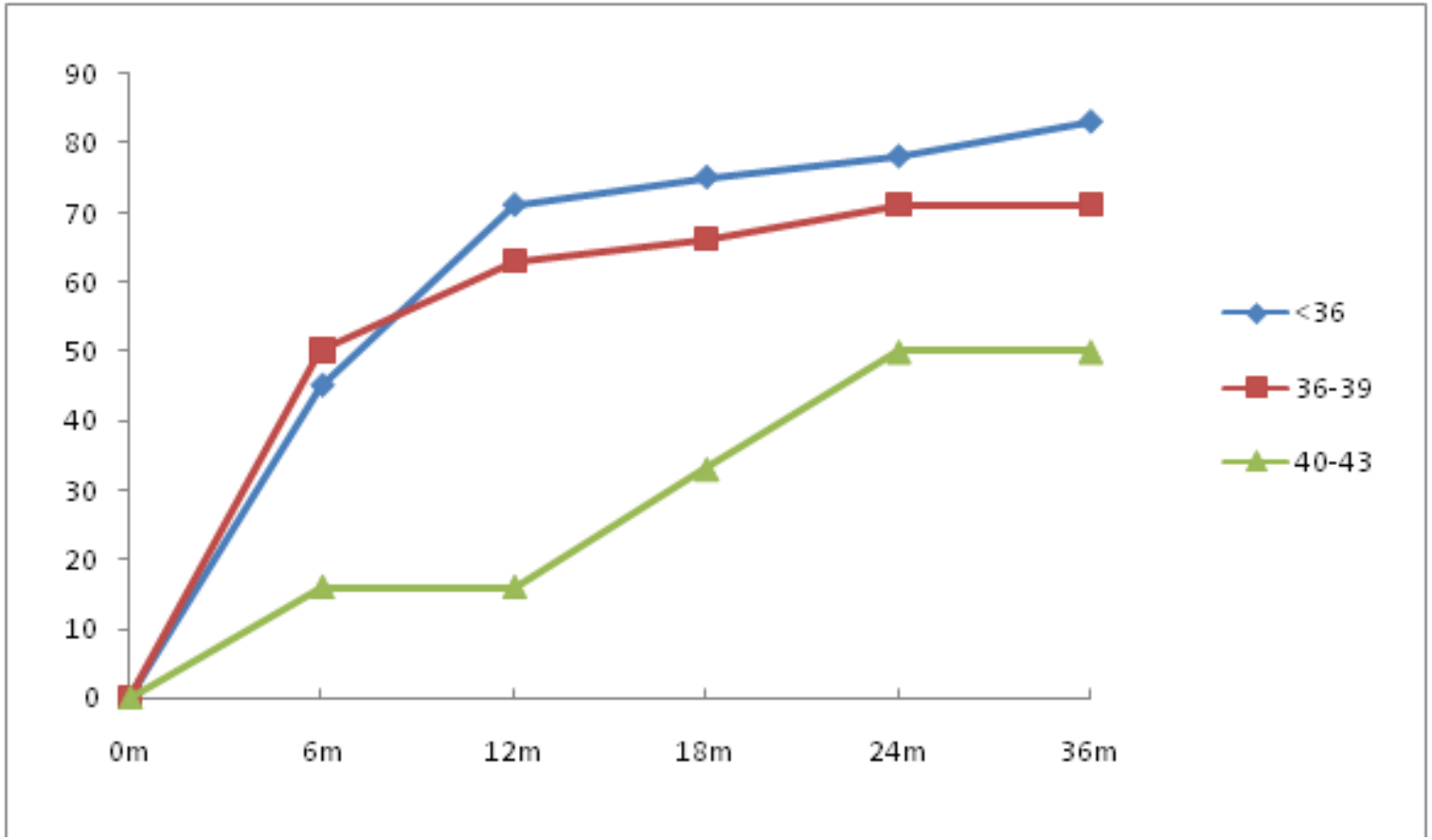
Ectopic pregnancy rate: 4–8%.

Prognostic factor affecting chance of conception

- Female age
- Status and the length of the tube
- Type of sterilization

Van Seeters et al, Hum Reprod Update, 23: 358-370-852, 2017

Cumulative pregnancy rate and age

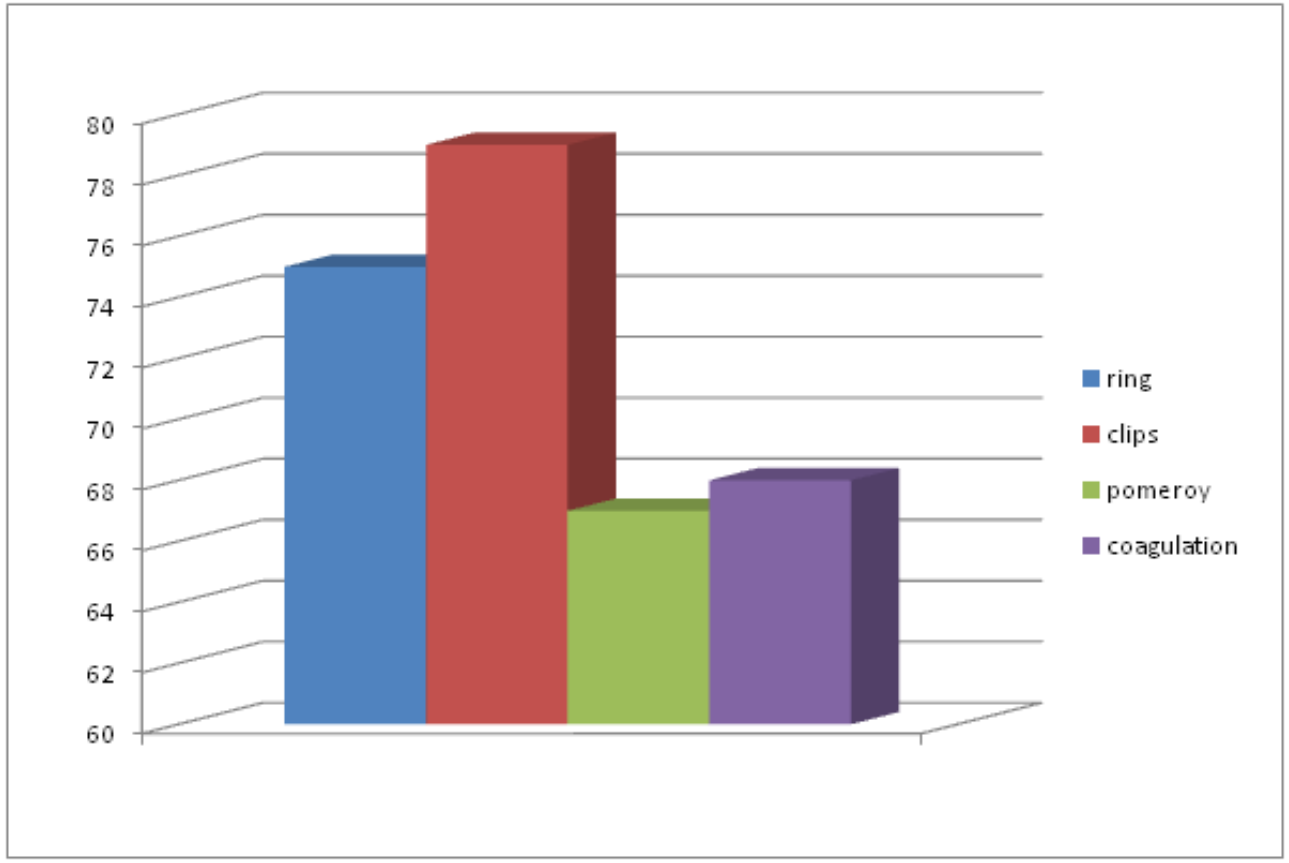


Cumulative pregnancy rate and age

Age	Cumulative live birth rate in 3 IVF cycles	% conceiving in 1 year
20-24	81%	86%
25-29	72%	78%
30-34	59%	63%
35-39	42%	52%
40-42	20%	43%

sismer

Intra-uterine pregnancy rate according to type of sterilization



Laparotomic versus laparoscopic anastomosis

By laparotomy	Pregnancy rate
Winston	69%
Gomel	80%
Boeckx	90%
Dubuisson	70%

laparoscopy	Technique	Pregnancy rate
Yoon	2 layer	87%
Koh	2 layer	71%
Dubuisson	Single suture	53%
Wiegerinck	Suture less	45%
Degueldre	Robot	71%

IVF or sterilization reversal?
What will influence the decision?

- Medical?
  - Age
  - Type of sterilization
  - Tubal length
  - Infection - damage
  - Sperm
- Personal?
  - Personal values, ethical
- Cost?
  - Cost for IVF
  - Cost of twin
- Centre?
  - Liberal referral to IVF
  - Experience - Training

Female sterilization reversal in the era of in-vitro fertilization

Curr Opin Obstet Gynecol. 2022 Aug

sterilization reversal still has a place in the management in restoring fertility.

Microsurgical anastomosis of the fallopian tubes after tubal ligation: a systematic review and meta-analysis

Juan Sastre [1], José Ángel Mínguez [1], Juan Luis Alcázar [1], Luis Chiva [2]

J Obstet Gynecol Reprod Biol - 2023 Dec

The patient's age was identified as the most significant determining factor when comparing the results of tubal reversal with in vitro fertilization

Proximal occlusion

- Nodular = nodular thickening of tunica muscularis leading to occlusion

  - salpingitis isthmica nodosa

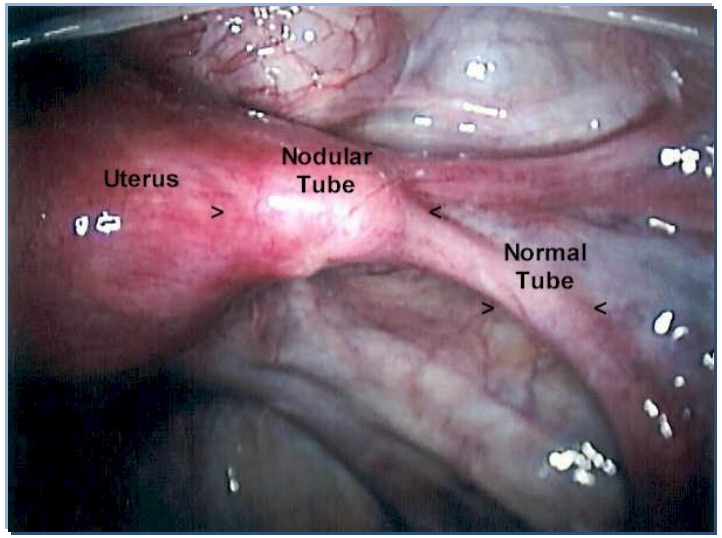
  - Endometriosis

  Poor results of microsurgery

- Pseudo occlusion

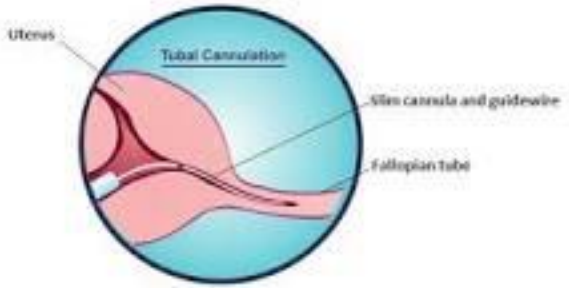
  - Mucus plugs, Hypoplastic tubes, polyp

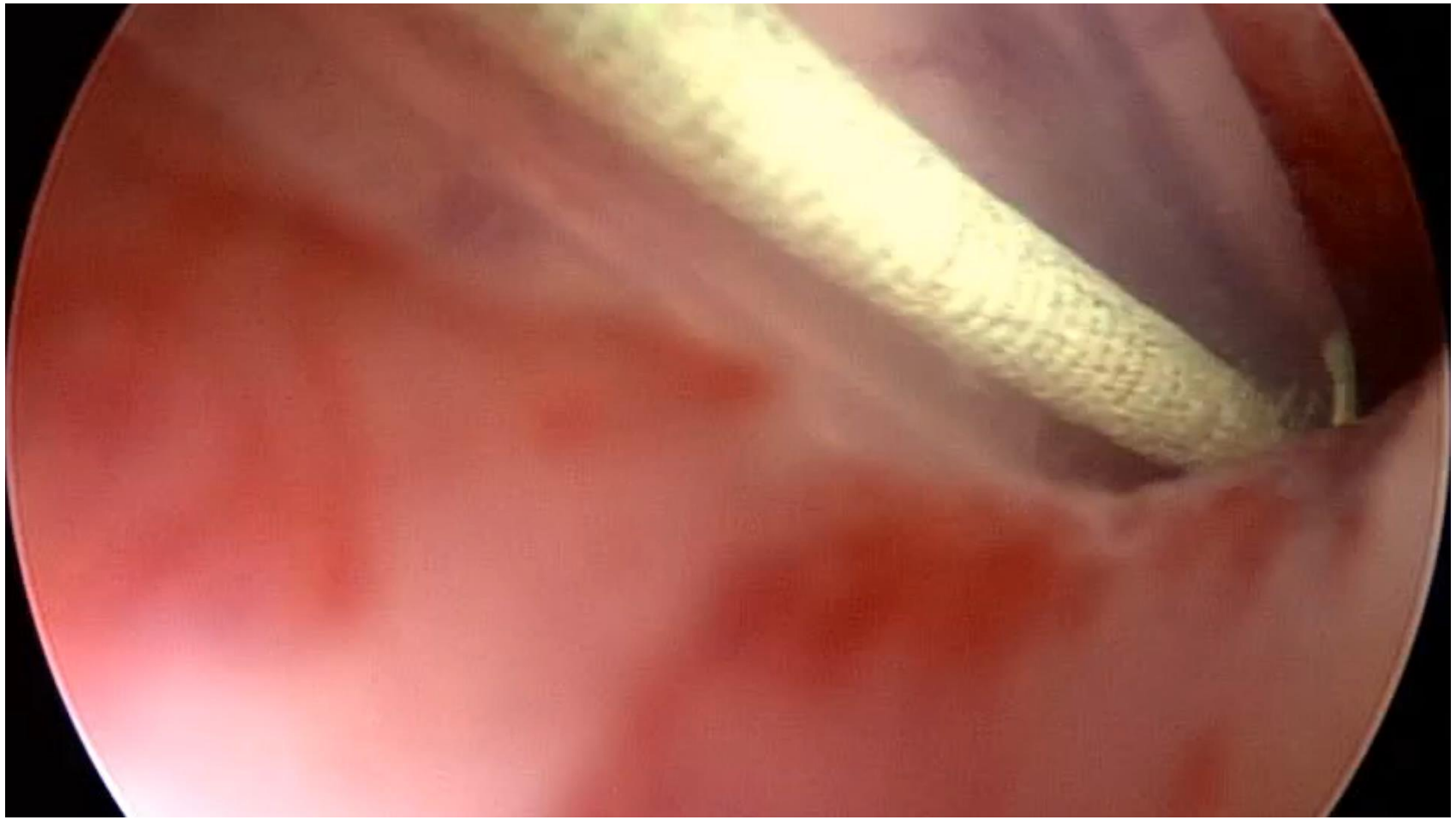
Hysteroscopic tubal catheterization



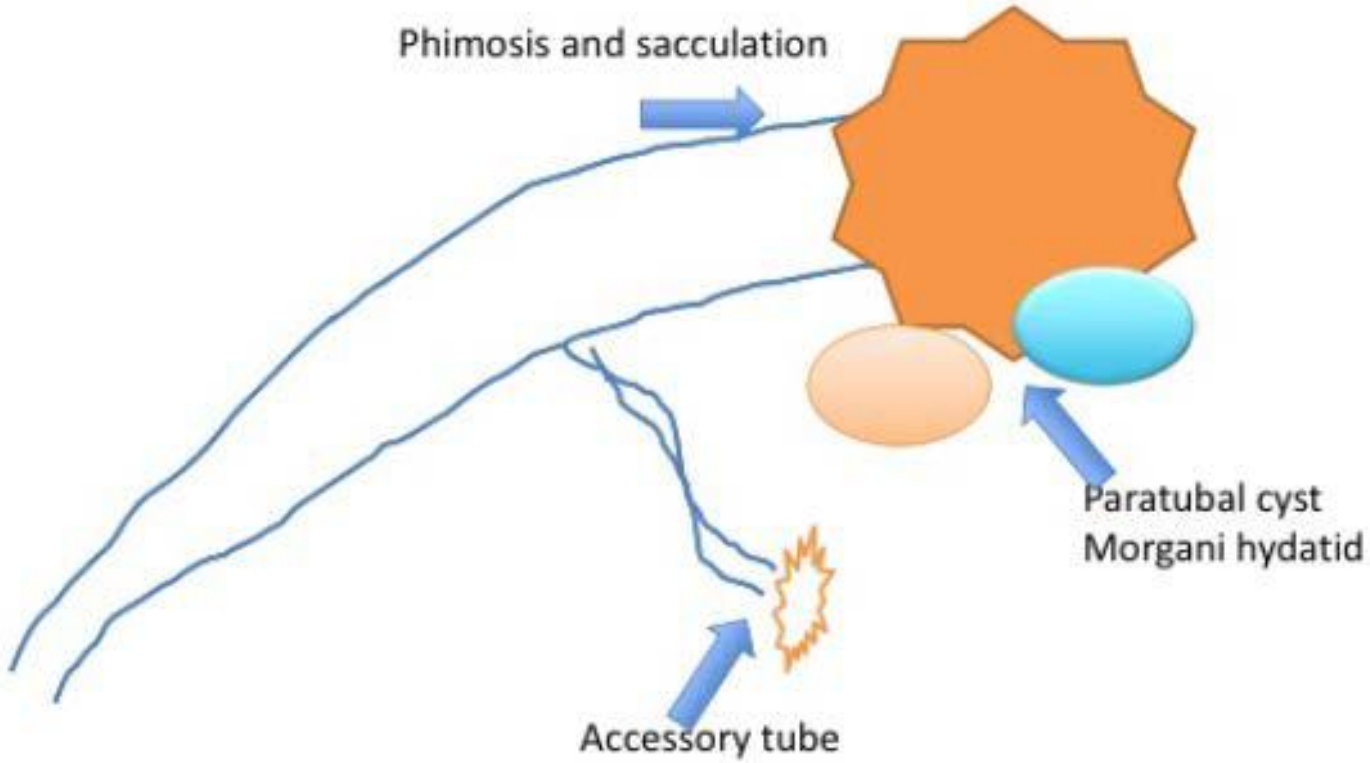
Proximal occlusion - Tubal cannulation?

	Nb ptn	Succesfull cannulation	Pregnancy rate
Das, RBMonline, 2007	53	68%	19%
Al-Jaroudi, J minim inv gynec, 2005	98	61%	32%
Keltz, JSLS, 2022	32	90%	34%

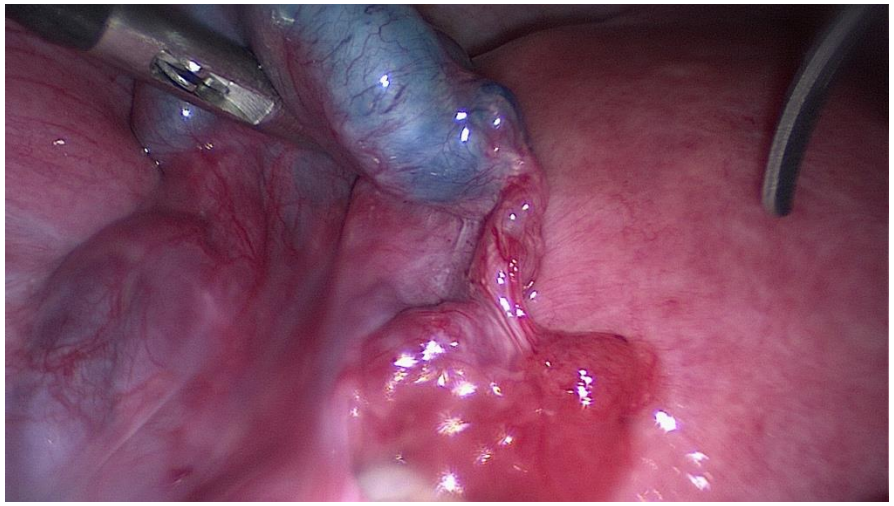


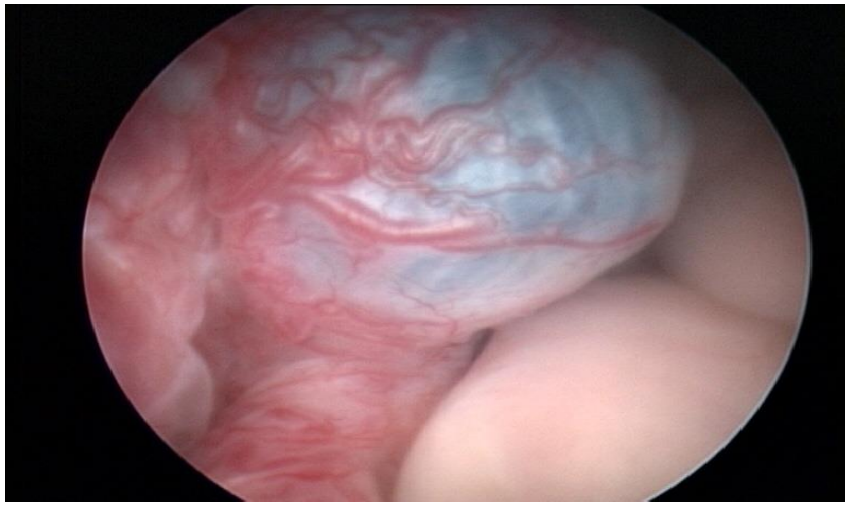


Subtle tubal lesions



What is the impact on fertility?





Subtle lesions

Subtle lesions: 67 (19.6%) out of 341 infertile patients

Phimosis/ fimbrial agglutination: 25 patients
Sacculation / ampullary hypoplasia: 18 patients
Accessory tubes: 8 patients
Paratubalcysts: 17 patients

Post-treatment pregnancy rates at 6 months: 34 (50.7%) out of 67 / No ectopics

Subtle tubal lesions might represent an underestimated cause of infertility

They could have an impact on fertility potential by impairing oocyte pick-up and embryo transportation

Diagnostic laparoscopy and treatment of subtle tubal lesions seems to be indicated in patients with “un-explained” infertility

Benmokhtar, Chauvin, Chaibiand Watrelot, GynecolObstetFertil, 40: 204–207, 2012

Hydatid of Morgani:
a possible underestimated cause of unexplained infertility

Group1: Laparoscopic removal of Morgagni

Group 2: No intervention

The pregnancy rate was higher in group I than group II when:

The cysts was bilateral (85.7% and 5.1% respectively, $p < 0.001$)
The cysts was fimbrial(85.6% and 9.1% respectively, $p < 0.001$)
The cyst diameter was 1–2 cm (58.1% and 20.5% respectively, $p < 0.001$)

Conclusions: Hydatid of Morgani is a possible underestimated cause of unexplained infertility. Laparoscopic removal of hydatid of Morgani was followed with a higher spontaneous pregnancy rate than no intervention

Rasheed and Abdelmonem, EJOGRB, 158: 62-66, 2011

Subtle lesions

Conception and pregnancy outcome after laparoscopic treatment of subtle distal fallopian tube abnormalities in infertile women: a prospective cohort study - Reproductive BioMedicine Online, 2022, Xingbang Zheng

876 infertility ptn – 28,7% subtle tube lesions

pregnancy outcomes after surgical treatment

natural pregnancy rate was 46.6%

Laparoscopy is an effective treatment for infertile patients with subtle abnormalities

- for young patients with a short infertile period
- at most two types of subtle abnormalities.

Conclusions: answers to the initial questions

Is there any impact of tubal factor infertility on IVF outcome?

Yes

- hydrosalpinx has a detrimental effect decreasing pregnancy rates by 40%

Is there an indication of surgical treatment?

Yes

- in cases of hydrosalpinges - surgical treatment improves LBR
- sterilization reversal still has a place in the management in restoring fertility
- proximal tubal occlusion - canulation?
- treatment for infertile patients with subtle abnormalities

Are there differences between the different types of surgical treatment options?

- Salpingectomy and proximal tubal ligation have the same results in case of hydrosalpinx

IVF versus tubal surgery

Tubal surgery and IVF are complementary

2 safeguards for tubal surgery

- Careful selection of cases
- Proper technique and training

Reproductive surgery is certainly not dead. It lives on with the promise of restoring the functional anatomy to enhance the chances of pregnancy.

It is our responsibility to train young residents adequately in this field to provide the right treatment at the right time.

Reprod Biomed Online - 2023 May - Jacques Donnez - Marie-Madeleine Dolmans

Thank you for your attention !

Sylvie Gordts
Isabelle Segaert
Valerie Schutyser
Patrick Puttemans
Marion Valkenburg
Rudi Campo
Stephan Gordts

www.lifeleuven.be