Società Medico Chirurgica di Ferrara

Preservazione della fertilità nella paziente affetta da endometriosi

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Endometriosis and Infertility

EPIDEMIOLOGY

- Endometriosis affects 10-15% of all women in reproductive age;
- Incidence: 40-60 in women with dysmenorrhoea; 20-30% in those with subfertility

Wills H et al., 2010, NHS Endometriosis Annual Evidence Update

- 20-50% of infertile women have endometriosis, and 30 to 50% women with endometriosis are infertile
- Infertile women are 6 to 8 times more likely to have endometriosis than fertile women

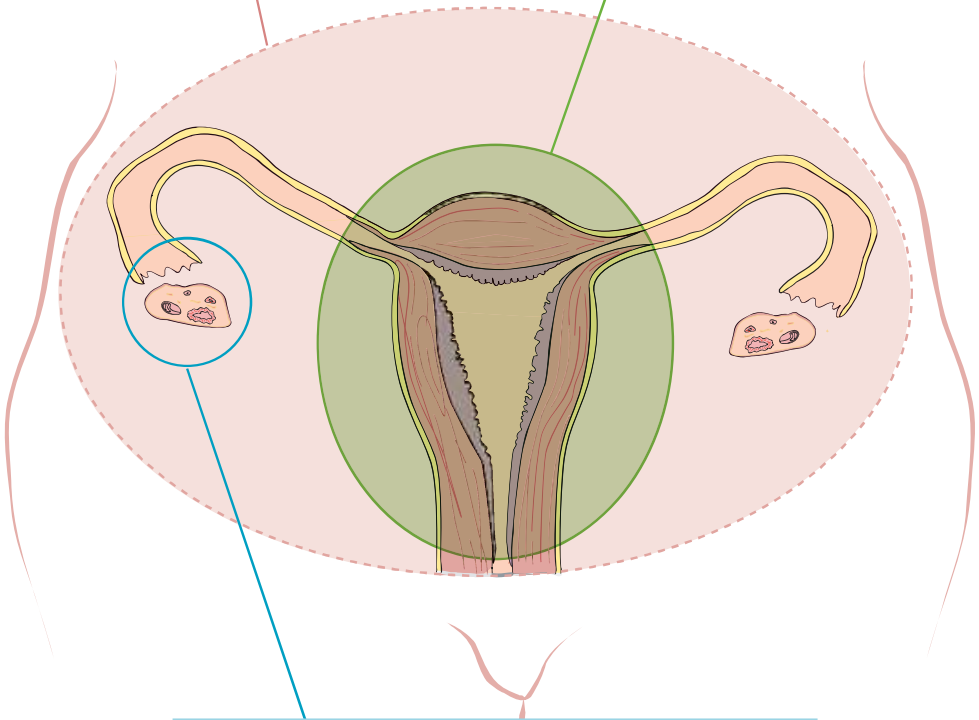
ASRM 2012, Fertility and Sterility

AMERICAN SOCIETY FOR REPRODUCTIVE MEDICINE

NHS
National Institute for Health and Clinical Excellence

Pelvic cavity
- Inflammatory changes in peritoneal fluid
  -proliferation of macrophages and phagocytic dysfunction
  -release of proinflammatory and angiogenic factors
- Changes in peritoneal fluid can affect sperm–oocyte interaction

Uterus
- Activation of steroidogenic factor 1 and aromatase
  -production of oestrogen in situ
  -resistance to progesterone
- Changes affect endometrium itself



Ovaries
- Functional ovarian tissue (ovarian reserve) reduced by endometriomas or surgery
- Response to controlled ovarian hyperstimulation (ART) hampered

Interleukins 1 and 6 directly affect sperm mobility

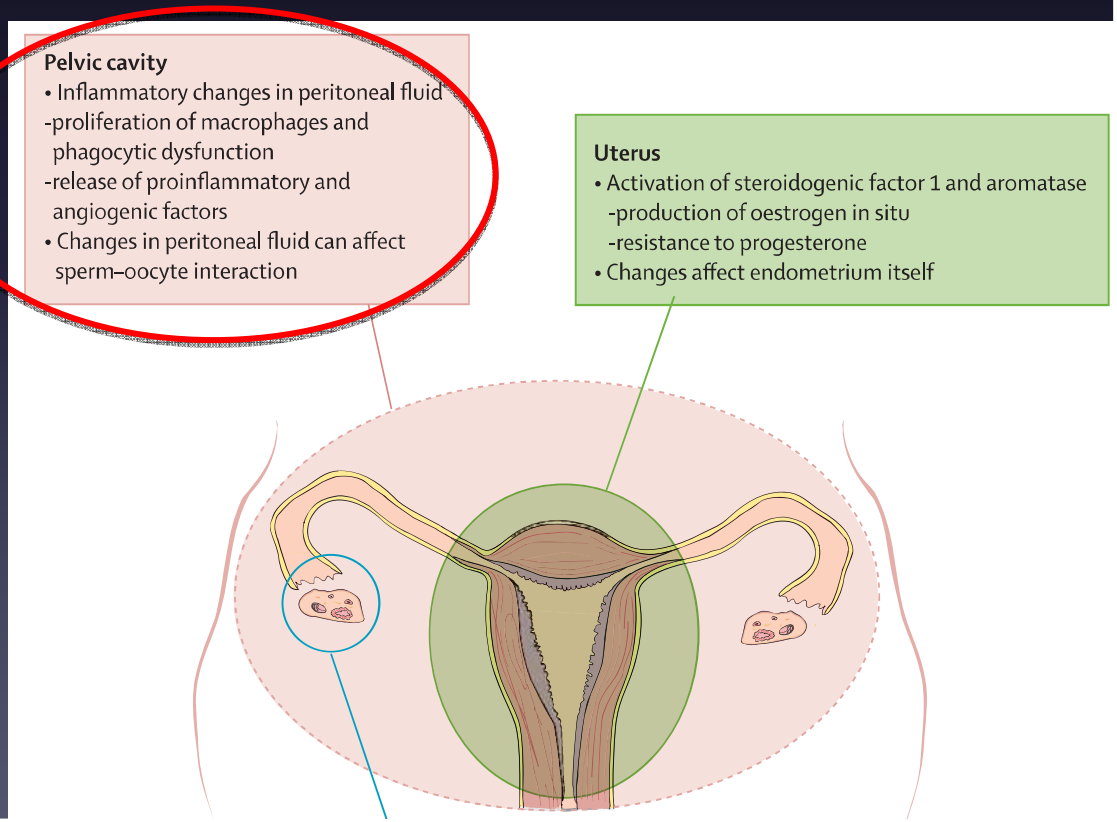
Yoshida S. et al. *Hum Reprod* 2004

Macrophage migration inhibitory factor is raised in peritoneal fluid of women with endometriosis

Perdichizzi A, et al. J Clin Immunol 2007

Tumour necrosis factor (TNF) α causes DNA damage to sperm

Mansour G, et al. Fertil Steril 2009



Migration inhibitory factor, TNFα, interleukin 6, and oxidative stress could hinder sperm capacitation

Said TM, et al. Fertil Steril 2005

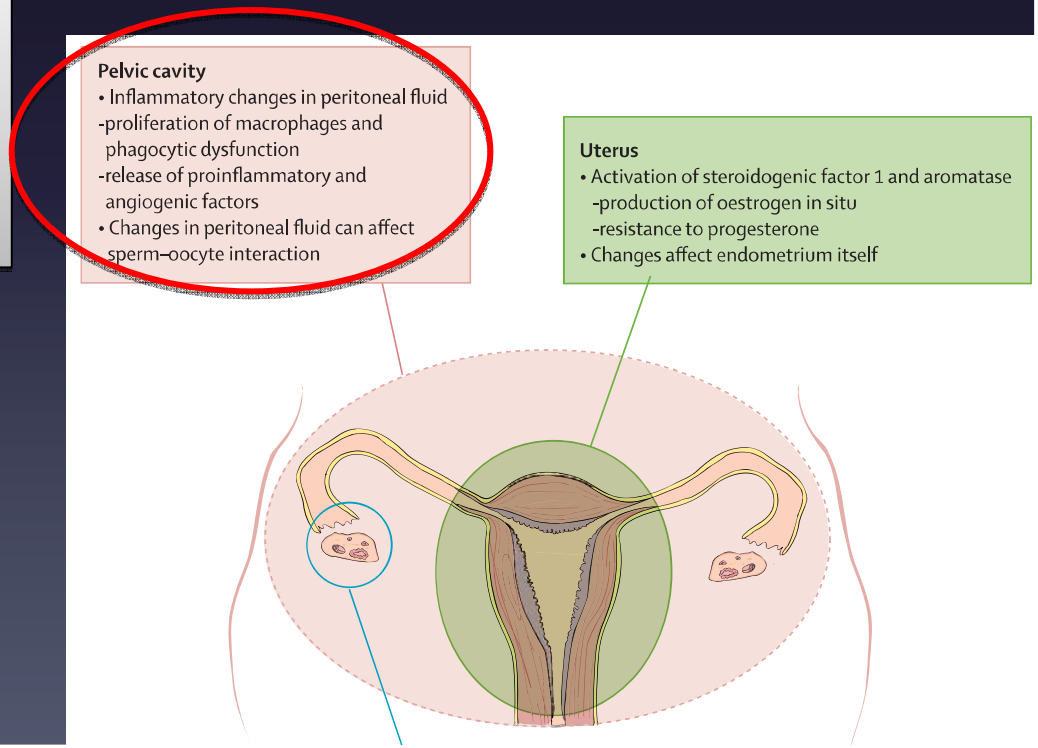
Iborra A, et al. Chem Immunol Allergy 2005

Carli C, et al. Endocrinology 2009

Peritoneal fluid decreases sperm binding to the zona pellucida through TNFα

Faber BM, et al. Obstet Gynecol 2001

Barbonetti A et al. Mol Hum Reprod 2008



Space-occupying effects, local reactions, or both, cysts can reduce the amount of functional ovarian tissue available, which could be aggravated further by surgery

Taylor RN et al. 2009

There is some evidence to suggest that endometriosis may be associated with a longer follicular phase with possibly lower serum estradiol levels and lower LH-dependent progesterone secretion during the luteal phase of the cycle

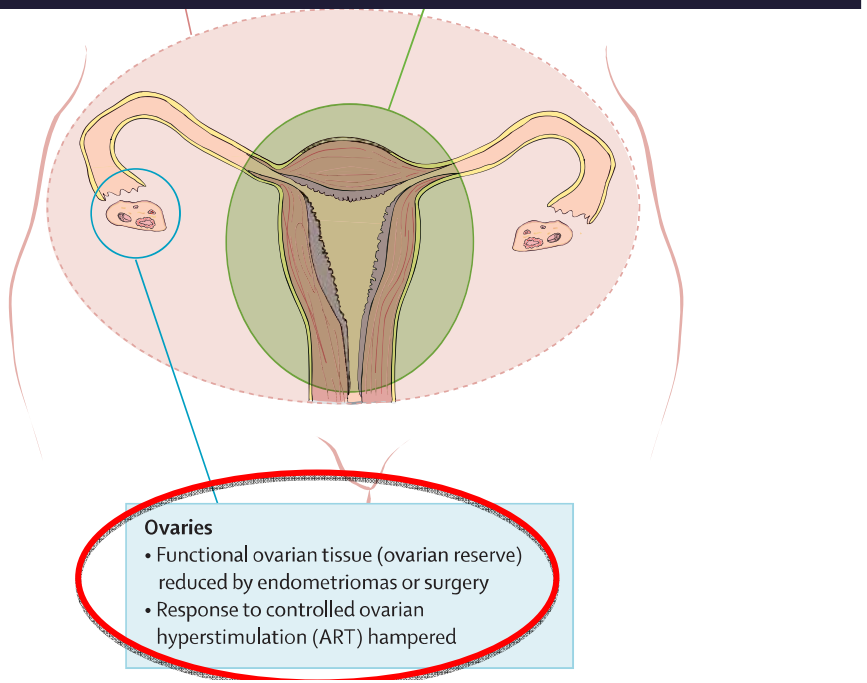
Cahill DJ et al. J Assist Reprod Genet 1997

Cunha-Filho JS et al. J Assist Reprod Genet 2003

Overproduction of embryotoxic cytokines and prostaglandins in peritoneal fluid affects oocytes and ensuing embryos

Akoum A, et al. Fertil Steril 2008

Sales KJ, et al. Reproduction 2003

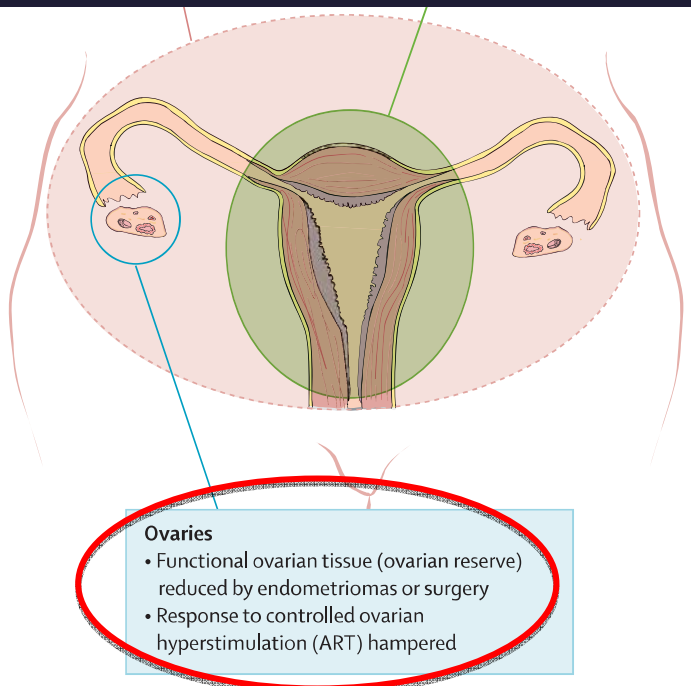


Embryos derived from women with endometriosis appear to develop more slowly compared to those embryos derived from women with tubal disease

Pellicer A, et al. Hum Reprod 1995.

Conversely, when donor oocytes from women with endometriosis are transferred into women without endometriosis, implantation rates are lower and embryo quality is reduced

Garrido N, et al. Hum Reprod Update 2002

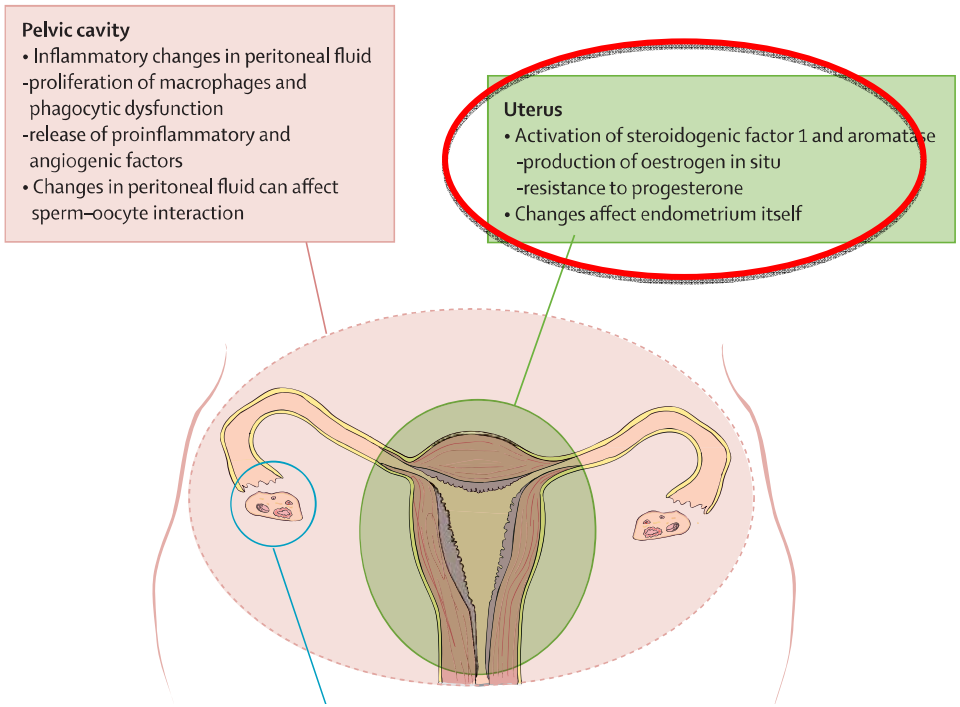


Anomalies are of two types: (1) abnormal, inflammation-related, in-situ production of oestradiol; and (2) overt resistance to the effects of progesterone

Lebovic DI, et al. Fertil Steril 2001.

IgG and IgA antibodies and lymphocytes may be increased in the endometrium of women with endometriosis. These abnormalities may alter endometrial receptivity and embryo implantation

Taylor RN. New York: Elsevier, 2009.

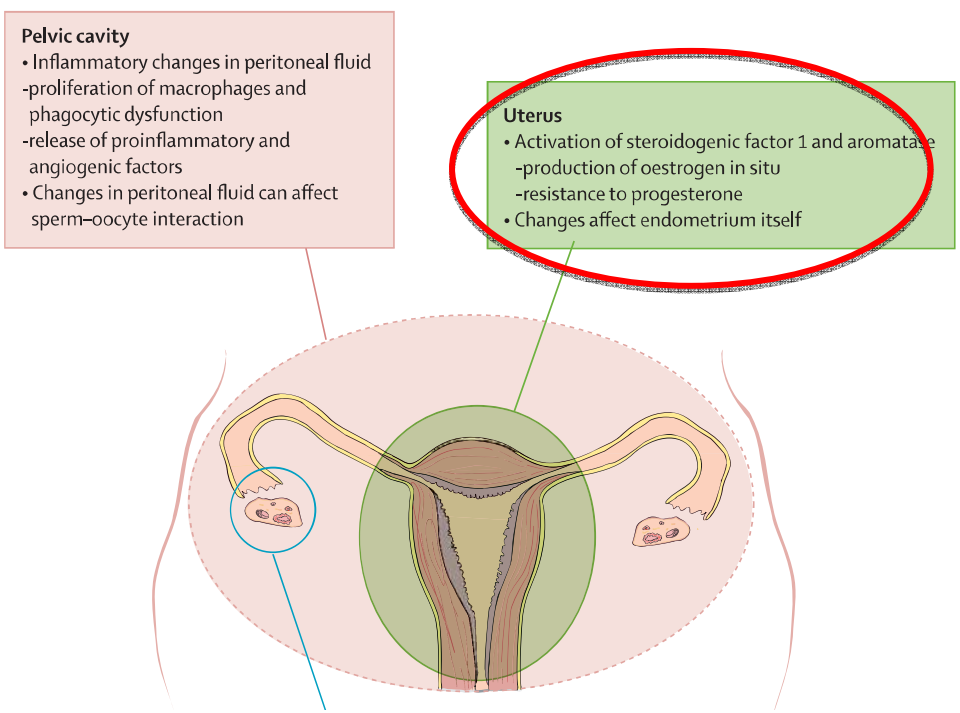


Reduced endometrial expression of avb3 integrin (a cell adhesion molecule) during the time of implantation has been described in some women with endometriosis

Lessey BA. J Clin Endocrinol Metab 1994

Very low levels of an enzyme involved in the synthesis of the endometrial ligand for L-selectin (a protein that coats the trophoblast on the surface of the blastocyst) have been observed in infertile women with endometriosis

Genbacev OD. Science 2003
Kao LC. Endocrinology 2003
Burney RO. Endocrinology 2007.



Endometriosis and Infertility

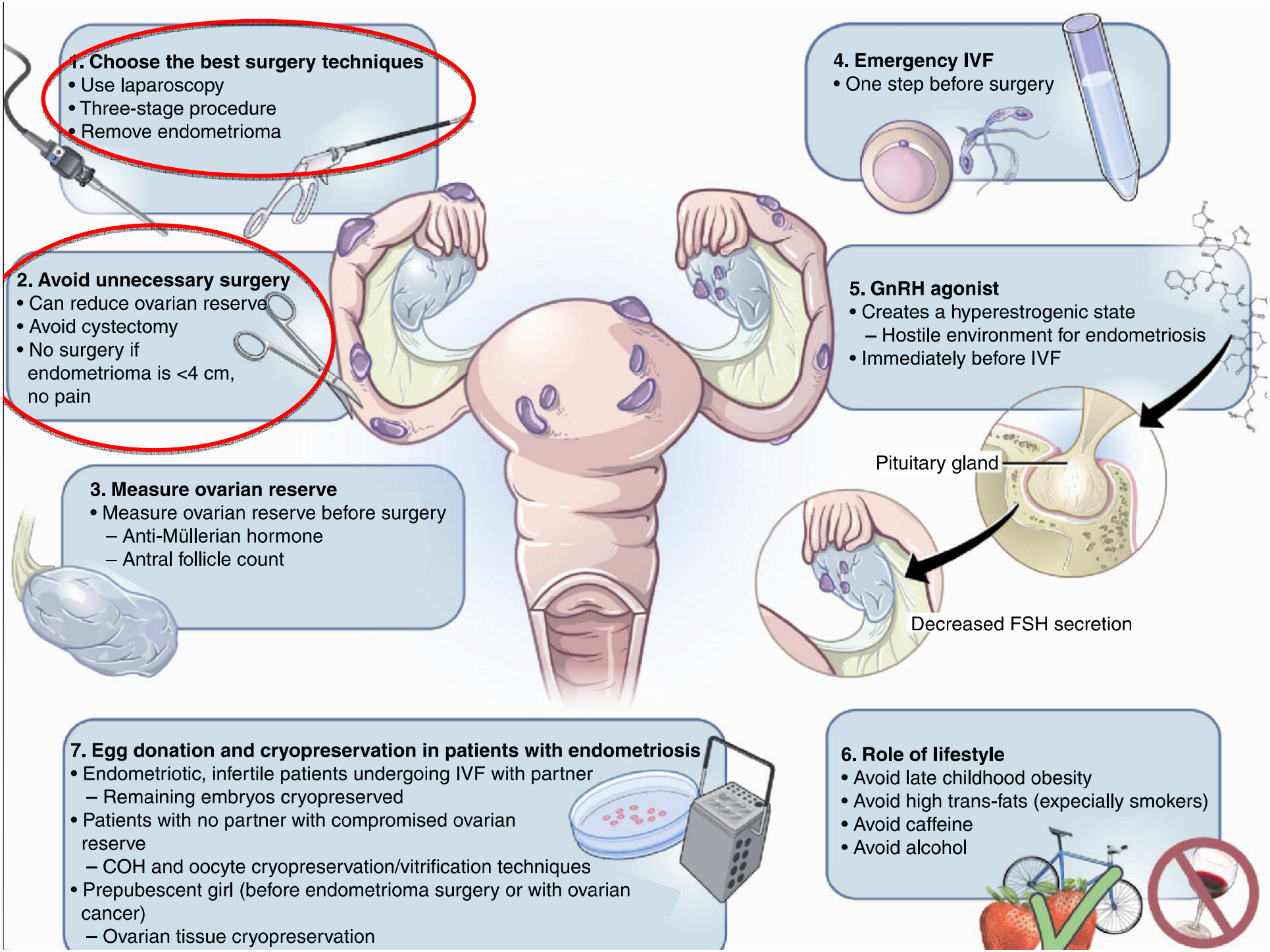
Approximately 20–30% of patients with endometriosis are infertile

imperative need to find ways to increase fertility rates in women with this disorder.

Eskenazi B et al., 2001

A study by Guzick et al. showed that fecundability decreased from 2.73 to 1.73% per month for patients with mild disease, and decreased further to 1.57% for patients with severe disease, thus implying that pregnancy rates significantly decrease as disease severity increases.

Guzick et al., Fert and Ster, 1997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1- Choosing the best surgical tecniques

Laparoscopy is considered the **gold-standard treatment** for ovarian endometriomas

Various techniques may be used include:

- cystic wall laser vaporization
- drainage
- bipolar coagulation of the cystic wall
- endometrioma stripping

Researchers still do not know which one is the most effective at avoiding ovary damage

Laparoscopic cyst stripping (cystectomy)

It has been postulated that laparoscopic cyst stripping (cystectomy) results in a significant loss of normal ovarian cortex, which can reduce ovarian reserve since the follicles lie within the cortex.

In addition, there is rising concern that cystectomy is more harmful to the adjacent normal ovarian tissue than laser ablation

There has been increasing evidence that ovarian responsiveness drops after surgical treatment for ovarian endometrioma

Benaglia et al., 2010

Figure 1 Sonographic findings in a 34-year-old woman who underwent excision of a 4 cm right ovarian endometrioma, three years prior to IVF.

A representative sonographic section of the operated and contralateral non-operated gonad on the day of hCG administration is shown in the upper and lower panel, respectively, and the total number of follicles with a mean diameter ≥11 mm in the two ovaries was 0 and 10, respectively.

Rate of severe ovarian damage following surgery for endometriomas

Laura Benaglia[1,2,3], Edgardo Somigliana[1], Valentina Vighi[1,2], Guido Ragni[1], Paolo Vercellini[1,2], and Luigi Fedele[1,2]

Human Reproduction, Vol.25, No.3 pp. 678–682, 2010

Advanced Access publication on January 17, 2010 doi:10.1093/humrep/dep464

Ninety-three women underwent surgery for monolateral endometriomas were recruited. Patients who underwent IVF were selected and, in all cases, follicular growth was monitored by serial transvaginal ultrasonography.

- The mean+SD number of follicles in the operated and contralateral gonads was **3.4+2.4 and 5.7+3.0**, respectively (P<0.001), with a mean 42% reduction in the number of follicles.
- **Absence of follicular growth was observed in 12 operated ovaries**. This event never occurred in the contralateral gonad (P<0.001). **The frequency of non-responsive ovaries following surgery was 13%** .

Best surgical approach: endometriomas > 4cm

Most studies indicate that surgery is the best option in the treatment of large (>4 cm) symptomatic ovarian endometriomas in infertile women

Carvalho et al., 2012

Women with endometriomas bigger than 4 cm may benefit from surgery:

- **for a correct diagnosis**
- **for establishing a good pelvic anatomy**
- **for easily performing egg retrieval during IVF treatment**

No significant change was noted in the ovulation rates preoperatively and postoperatively.

Nakagawa et al. 2007

In infertile women with AFS/ASRM stage III/IV endometriosis, clinicians can consider operative laparoscopy, instead of expectant management, to increase spontaneous pregnancy rates.	B

ESHRE 2013, draft version

The frequency of ovulation from the affected ovary decreases following laparoscopic cystectomy in infertile women with unilateral endometrioma during a natural cycle

Endometrioma size and ovulation rate:

- In patient with **relatively small endometrioma** (<4 cm in diameter) the ovulation rate after surgery (**19.8±6.7%**) was **significantly lower** than that before surgery (**41.0±8.0%, P=0.010**)
- In patient with **relatively large endometrioma** (≥4 cm in diameter), the ovulation rate after surgery (**13.5±5.8%**) was comparable to that before surgery (**26.8±10.9%**, P=0.330)

Table 2 Effects of endometrioma size on ovulation rate of the affected ovary before and after laparoscopic cystectomy

	Ovulation rate (%)		*P* value
	Before surgery	After surgery	
Total	34.4±6.6%	16.9±4.5%	0.013
A relatively small endometrioma (n=15, <4 cm in diameter)	41.0±8.0%	19.8±6.7%	0.010
A relatively large endometrioma (n=13, ≥4 cm in diameter)	26.8±10.9%	13.5±5.8%	0.330

Values are mean ± S.E.M. All observational cycles were unstimulated, and there was no cycle in which two or more follicles grew and ovulated. Wilcoxon signed rank test was used

In terms of preserving ovarian reserve, it is recommended that laparoscopic cystectomy should be performed for infertile patients with a large (≥4 cm) endometrioma.
However, for patients with a small (<4 cm) endometrioma you should exercise great care in deciding whether or not to perform cystectomy

Horikawa et al., J Assist Reprod Genet 2008

Endometriomas:

Cystectomy vs Three-stage procedure

Developed in 1996 by Donnez et al., the **three-stage technique** consists of:

1. **laparoscopic cyst drainage**
2. **gonadotropin-releasing hormone (GnRH) agonist** treatment for 3 months to reduce cyst diameter,
3. second laparoscopic procedure for **vaporization of the cyst** wall by CO_2

This combination technique is potentially more beneficial than cystectomy because normal ovarian tissue is not removed and it causes less thermal damage.

Hum Reprod. 1996 Mar;11(3):641-6.

Large ovarian endometriomas.

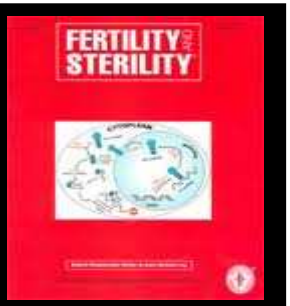
Donnez J, Nisolle M, Gillet N, Smets M, Bassil S, Casanas-Roux F.

Department of Gynecology, Catholic University of Louvain, Cliniques Universitaires St Luc, Brussels, Belgium.

Abstract

The management of large endometriomas was described in a series of 814 patients. Combined therapy using gonadotrophin-releasing hormone agonist (GnRHa) and carbon dioxide laser laparoscopy was proposed. Drainage and GnRHa for 12 weeks provoked a reduction of the endometrioma size up to 50% of the initial value. After vaporization of the internal wall, a cumulative pregnancy of 51% after 1 year was achieved. A recurrence rate of 8% was observed for a follow-up of 2-11 years. Histological data demonstrated that the epithelium covering the ovary which is the mesothelium can invaginate in the ovarian cortex. Some of the invaginations were seen to be continuous with endometrial tissue, strongly suggesting the metaplasia theory in the pathogenesis of ovarian endometrioma.

The impact on ovarian reserve after laparoscopic ovarian cystectomy versus three-stage management in patients with endometriomas: a prospective randomized study



Purpose: to focused on the difference in ovarian reserve impairment between laparoscopic stripping of endometriomas and the "three-step procedure"based on AMH and AFC changes.

TABLE 3

Comparison of the sonographic and serum indicators of ovarian reserve of groups 1 and 2 patients before and 6 months after laparoscopy.

	Group 1 one-step stripping (n = 10)			Group 2 three-step laser vaporization (n = 10)		
Variable	Baseline	Follow-up	*P* value	Baseline	Follow-up	*P* value
AFC	2.0 ± 1	2.4 ± 0.8	NS	1.3 ± 0.5	4.36 ± 0.8	.02
Mean (±SE) ovarian volume (mL)	89.7 ± 29.63	11.5 ± 4.8	NS	77.7 ± 23.6	11.0 ± 2.9	NS
FSH (mIU/mL)	7.2 ± 0.8	16.3 ± 3.8	NS	7.7 ± 0.8	11.1 ± 3.8	NS
LH (mIU/mL)	4.45 ± 0.8	6.5 ± 0.9	NS	5.7 ± 0.8	6.6 ± 0.9	NS
E_2 (pg/mL)	97.8 ± 25.9	74.9 ± 22.5	NS	48.7 ± 25.9	48.9 ± 22.5	NS
Inhibin B (pg/mL)	107.5 ± 13.9	122.5 ± 22	NS	103 ± 10.6	93.1 ± 12.6	NS
AMH (ng/mL)	3.9 ± 0.4	2.9 ± 0.2	.026	4.5 ± 0.4	3.99 ± 0.6	NS

Note: Values are mean ± SE. NS = not significant; AFC = antral follicle count; AMH = anti-Müllerian hormone.

Tsolakidis. Laparoscopic treatment of endometrioma and ovarian reserve. Fertil Steril 2010.

Tsolakidis et al., Fert Ster 2010

Endometriomas: Co2 laser

Long-term outcome, including pregnancy rate, recurrence rate and ovarian reserve, after laparoscopic laser ablation surgery in infertile women with endometrioma

Aim: To retrospectively assess the long-term outcome, including PR, recurrence rate and ovarian reserve, after laser ablation surgery in infertile women with endometrioma.

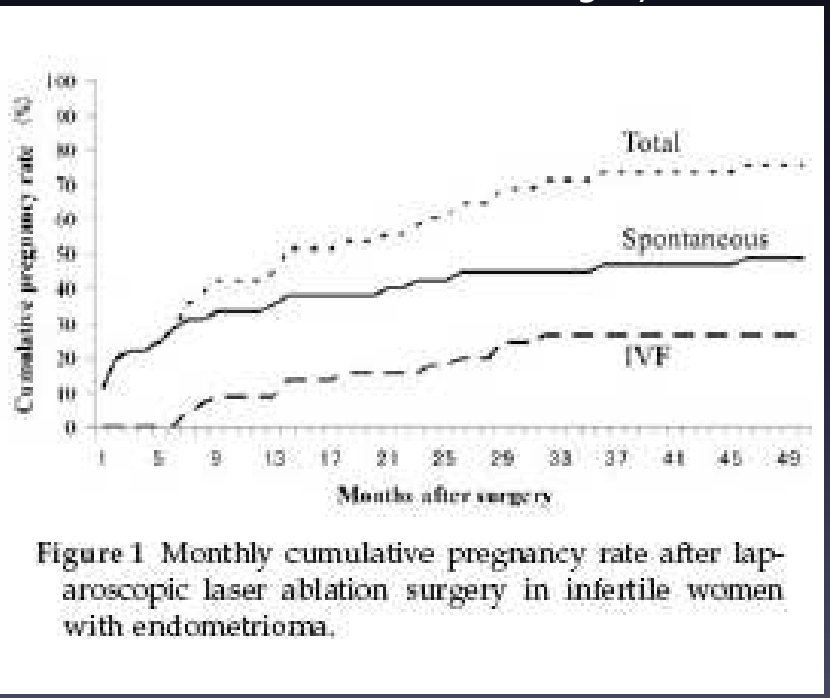


Figure 1 Monthly cumulative pregnancy rate after laparoscopic laser ablation surgery in infertile women with endometrioma.

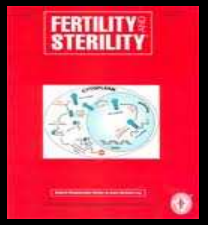
- OR was assessed based on the number of oocytes retrieved from the ovary that had been ablated versus the contralateral ovary: **no statistically significant difference was noted.**
- The overall pregnancy rate (spontaneous and IVF-induced) was 75.6%.

Surgery did not have any adverse effect on the OR during subsequent IVF

Shimuzu et al 2010 J Ob Gyn Res

Endometriomas: Co2 laser

Does ovarian surgery for endometriomas impair the ovarian response to gonadotropin?



Objective: To evaluate the ovarian response to stimulation conducted for IVF treatment in women who have undergone conservative surgery for endometriomas.

Study group: patients with **ovarian endometriomas who had undergone laparoscopic surgery**
Control group: patients with tubal factor infertility.

Results: No significant difference in the two groups in stimulation parameters or IVF outcome.

TABLE 1

Ovarian stimulation parameters.

	Endometriosis: Group 1, Ovarian cyst wall vaporization (n = 187 cycles)	Tubal: Group 2, control group (n = 633 cycles)
Number of ampoules	42.3 ± 17.8	43.9 ± 18.8
Number of follicles	15.3 ± 5.8	13.0 ± 6.1
Number of follicles > 15 mm	11.1 ± 5.2	10.7 ± 5.8
Number of mature oocytes	10.6 ± 4.2	8.6 ± 6.3
E_2 peak (pg/mL)	2258.7 ± 1663.6	2038.1 ± 1022.3
Fertilization rate	60.9%	61.4%
Number embryos/cycle	4.4 ± 3.2	4.0 ± 3.6
Number transferred embryos/cycle	2.5 ± 0.1	2.3 ± 0.9
Implantation	15.0%	14.9%
Ongoing pregnancy	37.4% (70/187)	34.6% (219/633)

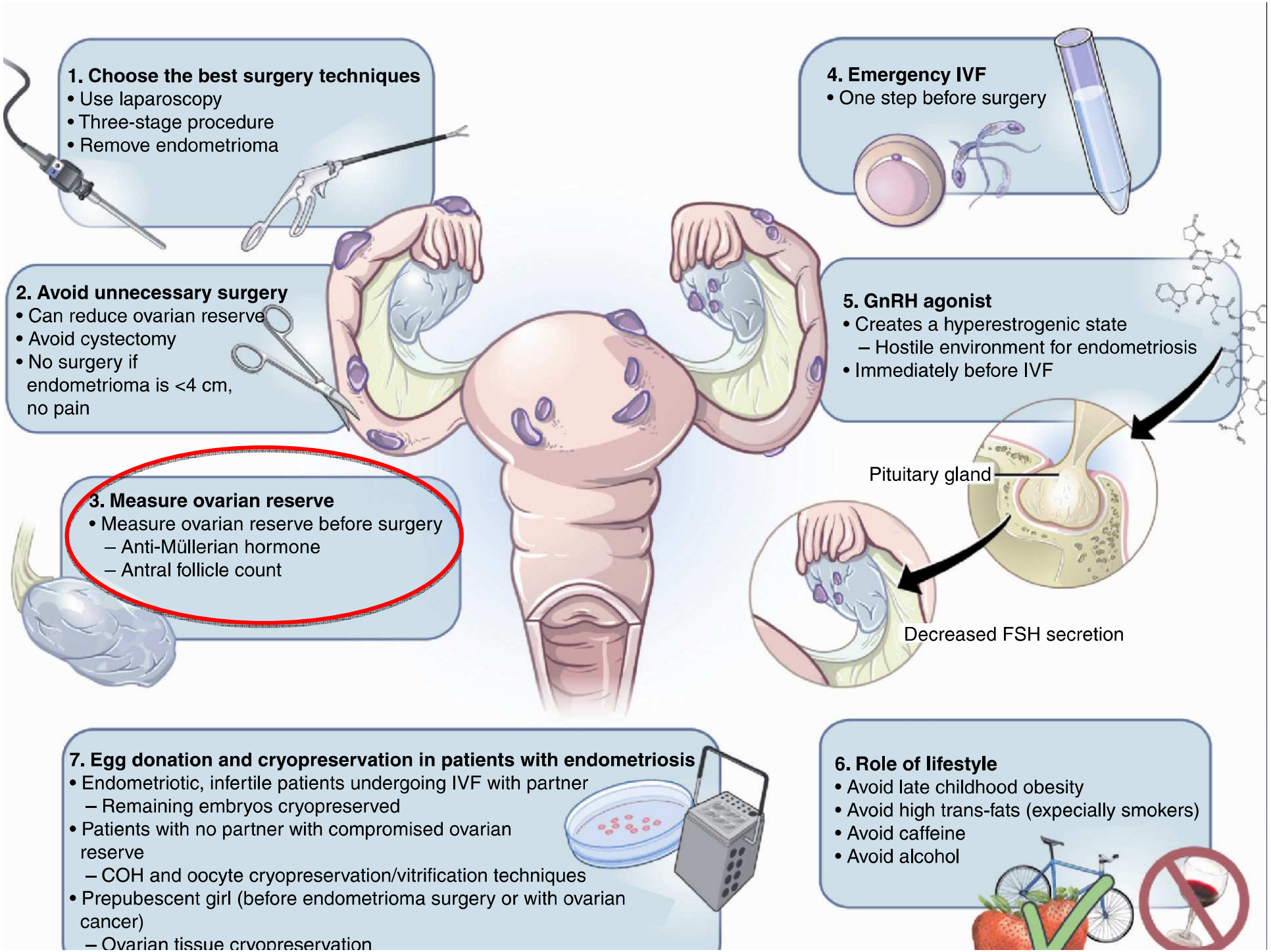
Donnez. Ovarian function and endometriosis. Fertil Steril 2001.

Laser ablation seems to be a good option for surgeons who want to decrease the chances of damaging ovaries. Laparoscopic cystectomy should be considered for endometriomas bigger than 4 cm that cause pain. In principal, it should be avoided when there is decreased OR. In order to choose the best ovarian endometrioma surgery technique, the recurrence rate should also be discussed with the patient

Donnez et al., 2001

To conclude

1. Each case must be individualized; in addition, careful surgery by experienced hands limits damage to OR.
2. Surgery on women with endometriosis is difficult, and if it is performed by inexperienced surgeons or in poor conditions it may be strongly deleterious to OR;
3. However, if it is carried out by experienced surgeons using careful, appropriate techniques, it may decrease the chances of negatively impacting OR.
4. The surgical techniques should be improved, specifically optimizing two main aspects: preventing injuries to the follicular reserve that follows surgical excision of ovarian endometriomas; and preventing postsurgical formation and reformation of adhesions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3- Measure OR before Surgery

Ovarian Reserve is defined as "**the functional potential of the ovary that reflects the quality of the follicles left in the ovary in any given time**".

Iwase et al., 2010 Fertil and Steril

To measure OR, numerous tests are available to assess fertility potential.

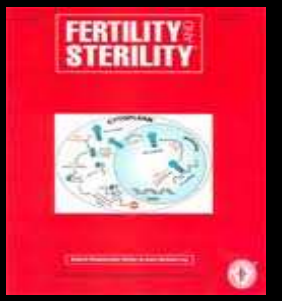
These tests can be divided into:

1. hormonal markers
2. ultrasound parameters
3. dynamic tests: the **exogenous FSH challenge test** is used to measure OR and predict IVF response rates. FSH, estradiol and inhibin B levels are measured before the administration of 300 IU of recombinant FSH on day 3. After 24 h, levels of estradiol should increase

Coccia et al., Ann NY Ac Sci, 2008

Basal FSH levels vs AMH pre- and post-surgery

Serum anti-Müllerian hormone level is a useful marker for evaluating the impact of laparoscopic cystectomy on ovarian reserve



Purpose:To assess the impact of laparoscopic surgery on ovarian reserve, in order to evaluate pre- and postoperative levels of AMH in comparison with basal levels of FSH.

• The granulosa cells of growing pre-antral and small antral follicles produce AMH. It is more specific than FSH, and its levels do not vary with the phases of the menstrual cycle. Moreover, it is not affected by the use of oral contraceptives or GnRH analogs

Taken together, it seems that serum AMH level, and not basal FSH level, is a useful ovarian reserve marker in women with ovarian-invasive treatment.

The impact of endometrioma and laparoscopic cystectomy on serum anti-Müllerian hormone levels

RBE REPRODUCTIVE BIOLOGY AND ENDOCRINOLOGY

Objective: The aim of this study was to evaluate the impact of endometrioma and laparoscopic cystectomy on ovarian reserve as measured by serum AMH levels.

Results:

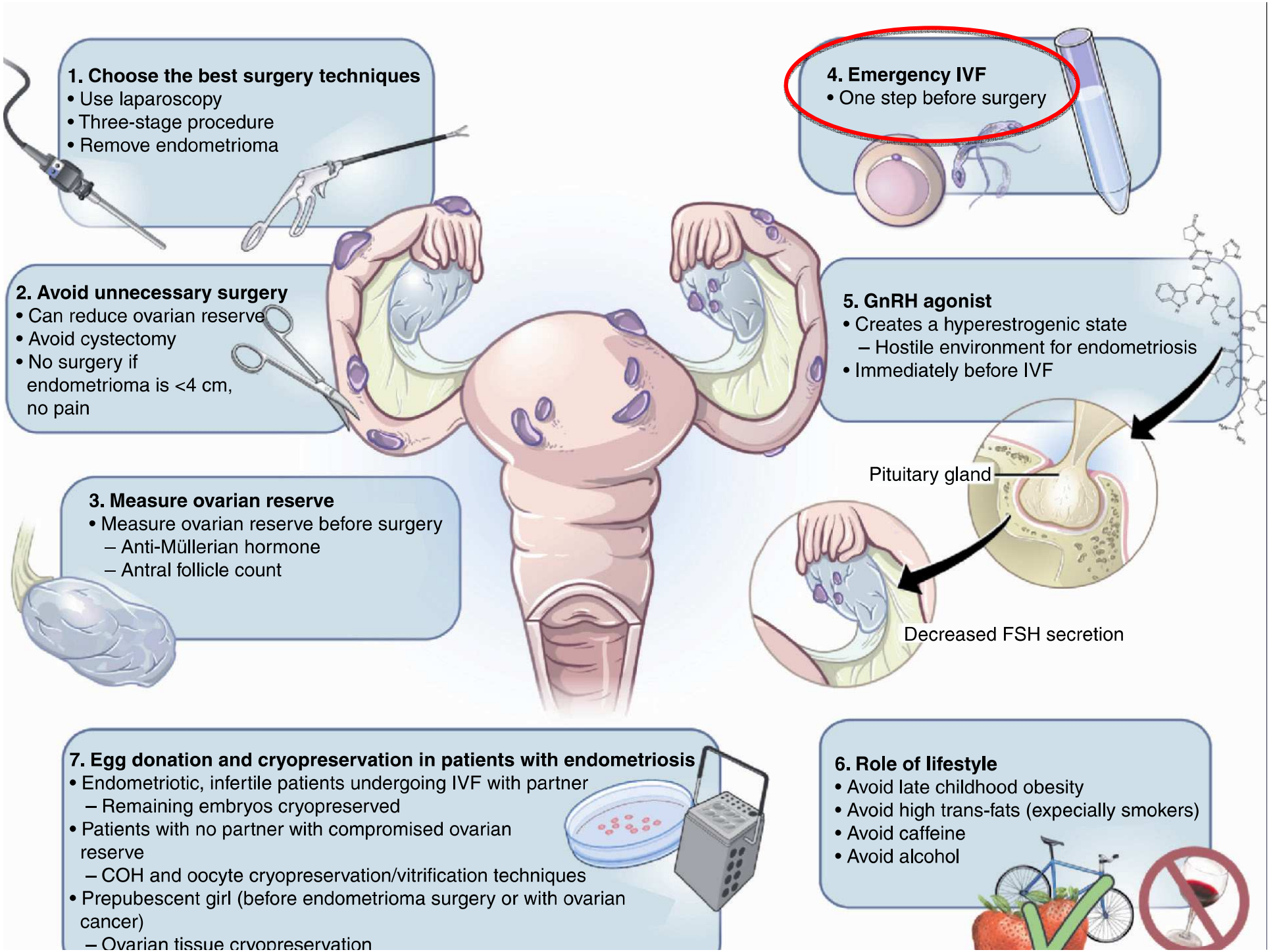
women **without endometriosis** had **higher AMH** levels than those with the disease.

In endometriosis group, patients underwent **surgery** had **lower AMH** levels than those who did not.

Patients with **bilateral endometriomas** had **lower levels of AMH** than those with unilateral disease.

This study concluded that it is imperative to assess OR prior to surgery so that women with low ORs can be identified and counseled appropriately. Although the stratification does not change the patient's risk, OR should be measured in order to discuss the risks and benefits of surgery with the patient.

If these patients are not identified prior to surgery, the aggressive nature of cystectomy could lead to ovarian failure.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Emergency IVF before surgery

Endometriosis and infertility: pathophysiology and management

The authors suggested a novel idea, an that **emergency IVF, that is an IVF before surgery**

It should be considered in many cases:

- when ovarian function is compromised
- when natural conception is not possible

Endometriosis and infertility: pathophysiology and management

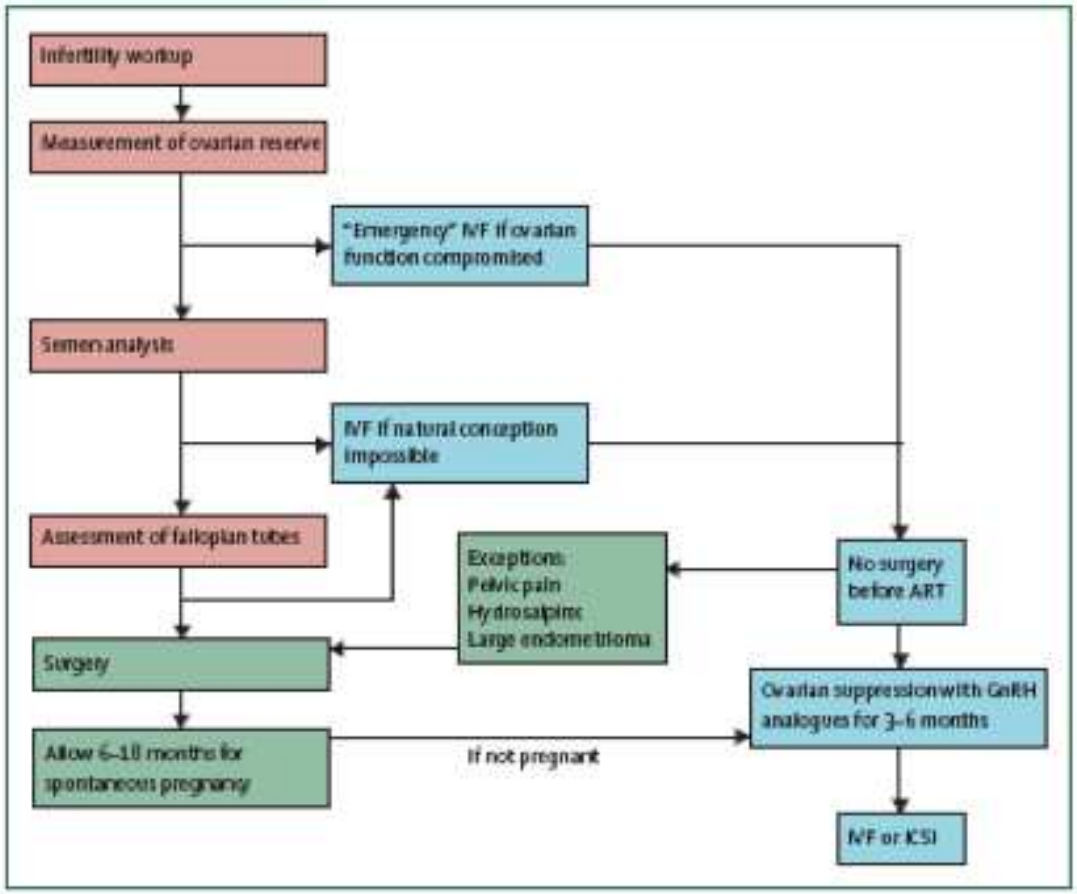
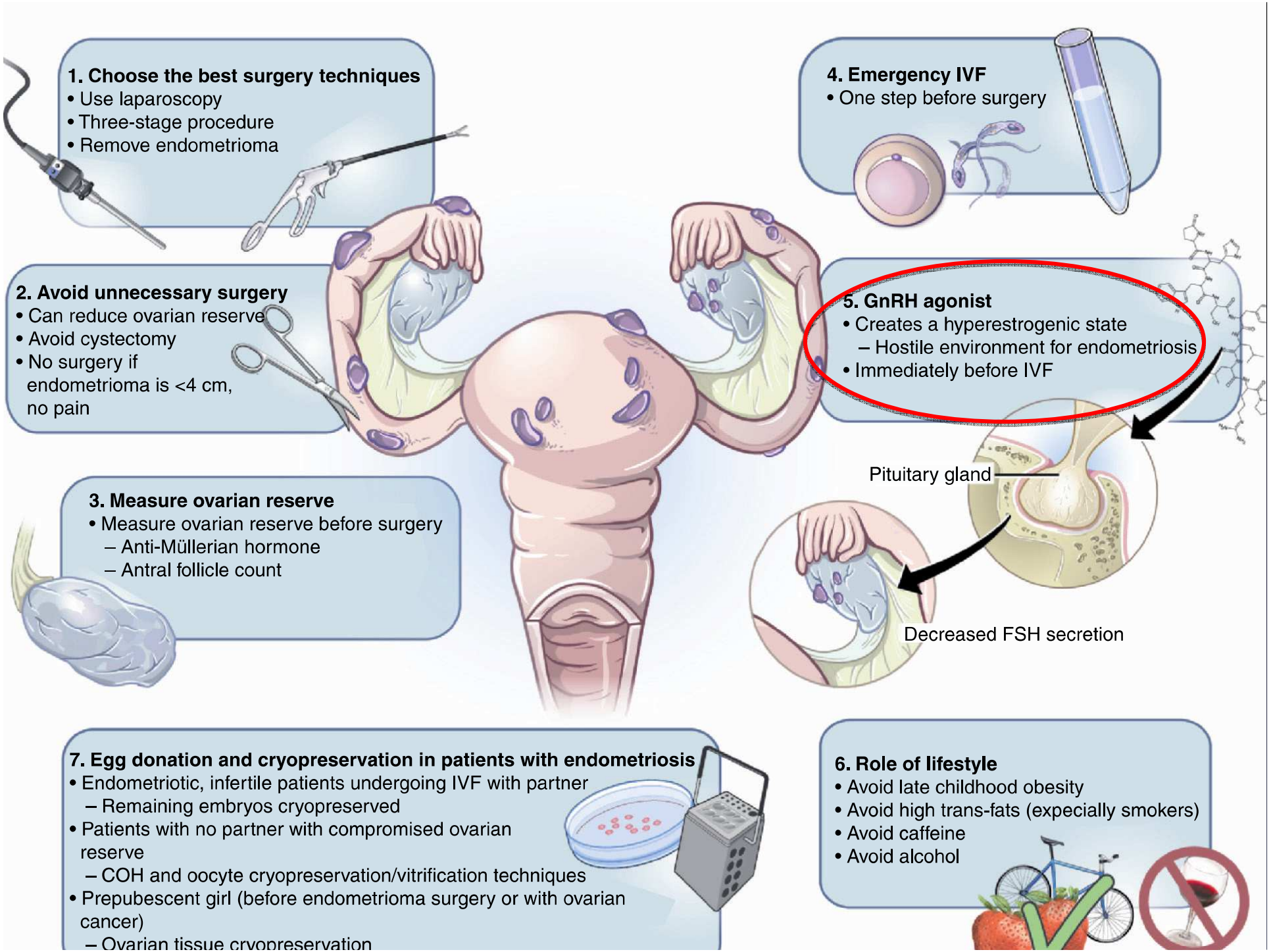


Figure 2: Algorithm for management of infertility associated with endometriosis
IVF=in-vitro fertilisation. ART=assisted reproductive technologies. GnRH=gonadotropin-releasing hormone. ICSI=intracytoplasmic sperm injection.

Indication for surgery: intact OR, unilateral disease, rapid growth, severe disease, debilitating pain or large endometriomas

Indication for emergency-IVF: age >38, an altered OR or have long-term infertility, characteristics of the semen and the tubal status are incompatible with natural conception,

This is a novel approach and more studies should be done to better understand the real benefits of using IVF before treatment.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Use of GnRH Analogues in patients with endometriosis

The establishment, maintenance and growth of endometriosis depends on estrogen, and thus many treatment plans include hormonal therapy.

Ruhland et al., 2011

Artificial GnRH analogs increase receptor affinity and decrease the degradation of natural GnRH, which causes the **sustained activation of GnRH receptors**, thereby releasing gonadotropins stored in the pituitary.

Following their release, there is a **downregulation of GnRH-receptor expression**, which suppresses gonadotropin secretion, ultimately resulting in a drop in sex-steroid production in the ovaries. This generates a **hypoestrogenic state** that creates an unfavorable environment for the growth and maintenance of endometriosis

Olive et al., 2008

Long-term pituitary down-regulation before in vitro fertilization (IVF) for women with endometriosis (Review)

Sallam HN, Garcia-Velasco JA, Dias S, Arici A, Abou-Setta AM

THE COCHRANE COLLABORATION®

Written in 2006. reprinted in 2010

Long-term pituitary down-regulation before in vitro fertilization (IVF) for women with endometriosis (Review)

THE COCHRANE COLLABORATION®

Oucome 2 clinical pregnancy rate per woman: significantly higher (P=0.042)

Analysis 1.1. Comparison 1 GnRH agonist versus no agonist before IVF or ICSI, Outcome 1 Live birth rate per woman.

Review: Long-term pituitary down-regulation before in vitro fertilization (IVF) for women with endometriosis

Comparison: 1 GnRH agonist versus no agonist before IVF or ICSI

Outcome: 1 Live birth rate per woman

Study or subgroup	GnRH agonist n/N	Control n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
Dicker 1992	8/35	1/32		100.0 %	9.19 [1.08, 78.22]
Total (95% CI)	**35**	**32**		**100.0 %**	**9.19 [1.08, 78.22]**

Total events: 8 (GnRH agonist), 1 (Control)

Heterogeneity: not applicable

Test for overall effect: Z = 2.03 (P = 0.042)

Long-term pituitary down-regulation before in vitro fertilization (IVF) for women with endometriosis (Review)

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Oucome 1: live birth rate per woman: significantly higher in women receiving the GnRH agonist compared to the control group (P=0.042)

Analysis 1.2. Comparison 1 GnRH agonist versus no agonist before IVF or ICSI, Outcome 2 Clinical pregnancy rate per woman.

Review: Long-term pituitary down-regulation before in vitro fertilization (IVF) for women with endometriosis

Comparison: 1 GnRH agonist versus no agonist before IVF or ICSI

Outcome: 2 Clinical pregnancy rate per woman

Study or subgroup	GnRH agonist n/N	Control n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
Dicker 1992	12/35	2/32		20.2 %	7.83 [1.59, 38.47]
Rikkes 2002	21/28	9/19		39.4 %	3.33 [0.96, 11.54]
Surrey 2002	20/25	14/26		40.4 %	3.43 [0.99, 11.93]
Total (95% CI)	**88**	**77**		**100.0 %**	**4.28 [2.00, 9.15]**

Total events: 53 (GnRH agonist), 25 (Control)

Heterogeneity: Chi² = 0.83, df = 2 (P = 0.66); I² =0.0%

Test for overall effect: Z = 3.75 (P = 0.00018)

0.01 0.1 1 10 100

Favours control Favours GnRH agonist

Long-term pituitary down-regulation before in vitro fertilization (IVF) for women with endometriosis (Review)

THE COCHRANE COLLABORATION®

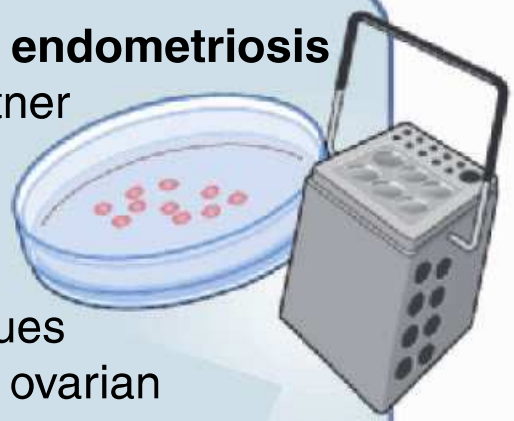
Authors' conclusions:

The administration of GnRH agonists for a period of three to six months prior to IVF or ICSI in women with endometriosis increases the odds of clinical pregnancy by fourfold.

Data regarding adverse effects of this therapy on the mother or fetus are not available at present.

7. Egg donation and cryopreservation in patients with endometriosis

- Endometriotic, infertile patients undergoing IVF with partner
  - Remaining embryos cryopreserved
- Patients with no partner with compromised ovarian reserve
  - COH and oocyte cryopreservation/vitrification techniques
- Prepubescent girl (before endometrioma surgery or with ovarian cancer)
  - Ovarian tissue cryopreservation



Cryopreservation in patients with endometriosis

Another method, called **vitrification**, involves the solidification of an aqueous solution by ultra-rapid cooling.

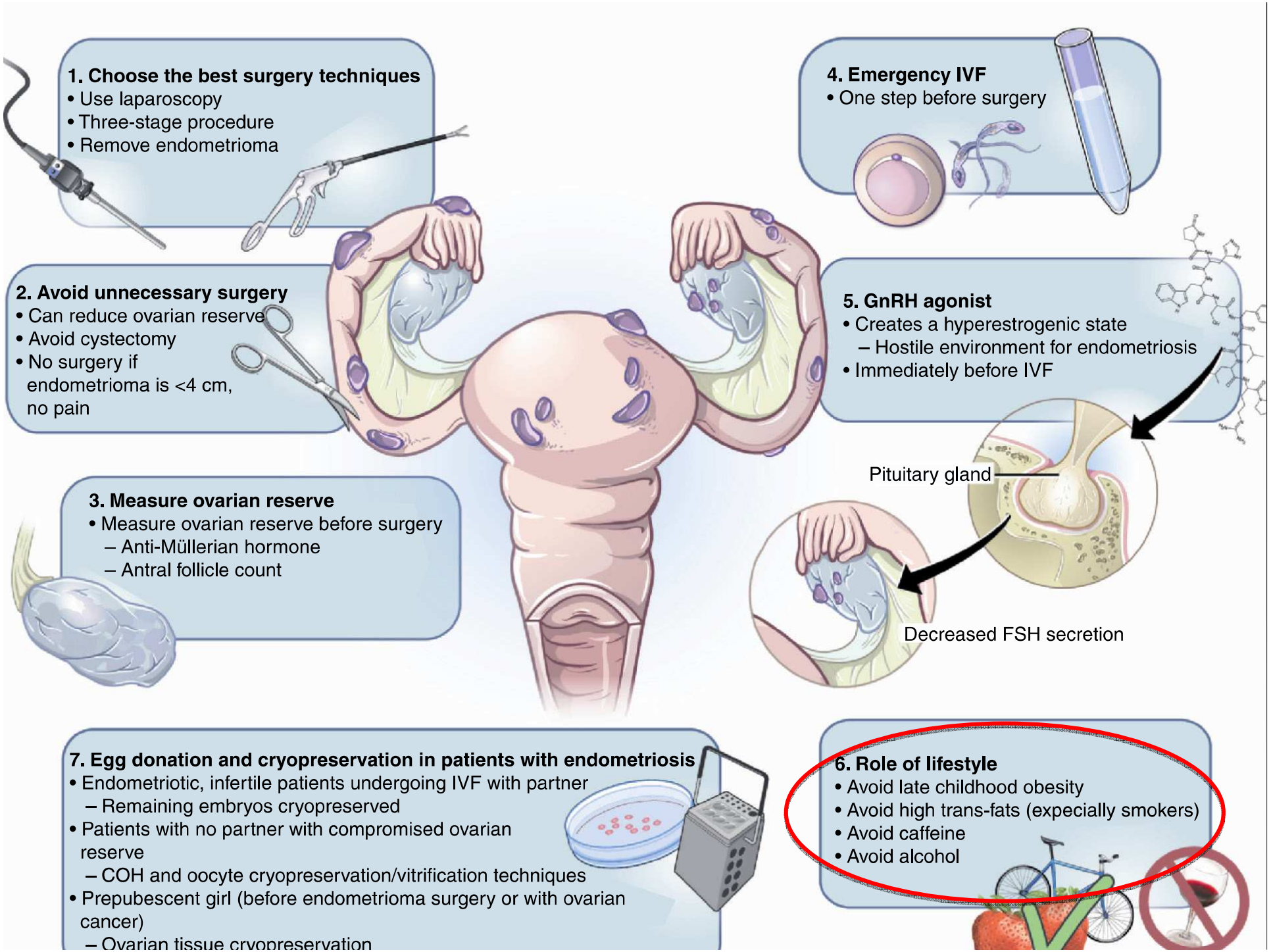
• **more successful** than the slow-freezing/rapid-thawing method in terms of oocyte survival, implantation and clinical pregnancy rates

Elizur et al., 2009

Rienzi *et al*. (2002) reported that the survival rate of sibling-vitrified oocytes was 96.8% and the fertilization rate after ICSI was 76.6%.

Another method, known as ovarian tissue cryopreservation, involves reimplantation of cortical ovarian tissue into the pelvic cavity or a heterotopic site. This method is associated with a 25% follicle survival rate, but is most successful when patients are younger than 40 years of age.

Donnez et al., 2006


1. Choose the best surgery techniques
• Use laparoscopy
• Three-stage procedure
• Remove endometrioma
2. Avoid unnecessary surgery
• Can reduce ovarian reserve
• Avoid cystectomy
• No surgery if endometrioma is <4 cm, no pain
3. Measure ovarian reserve
• Measure ovarian reserve before surgery
– Anti-Müllerian hormone
– Antral follicle count
4. Emergency IVF
• One step before surgery
5. GnRH agonist
• Creates a hyperestrogenic state
– Hostile environment for endometriosis
• Immediately before IVF
Pituitary gland
Decreased FSH secretion
6. Role of lifestyle
• Avoid late childhood obesity
• Avoid high trans-fats (expecially smokers)
• Avoid caffeine
• Avoid alcohol
7. Egg donation and cryopreservation in patients with endometriosis
• Endometriotic, infertile patients undergoing IVF with partner
– Remaining embryos cryopreserved
• Patients with no partner with compromised ovarian reserve
– COH and oocyte cryopreservation/vitrification techniques
• Prepubescent girl (before endometrioma surgery or with ovarian cancer)
– Ovarian tissue cryopreservation

Body weight and exercise

Various studies have shown that endometriosis may actually be more common in tall, lean women than in heavier women

Cramer et al, 2002, Missmer et al, 2004

A study by Missmer *et al*. (2004) showed an **inverse relationship between BMI at 18 years and endometriosis.** A decreased risk was also noted in overweight and obese females with concurrent infertility. The authors correlated these finding with the higher prevalence of oligomenorrhea among obese women. This may explain their increased risk of infertility and decreased risk of endometriosis

Women who started exercising at a younger age and exercised regularly, defined as more than 2 h per week, were at a lower risk. This may be explained by the fact that regular exercise lowers estrogen levels

Cramer et al., 1986

Diet

Parazzini *et al*. (2004) reported a positive association between endometriosis and red meat consumption, and a negative association between endometriosis and fruit and vegetable consumption

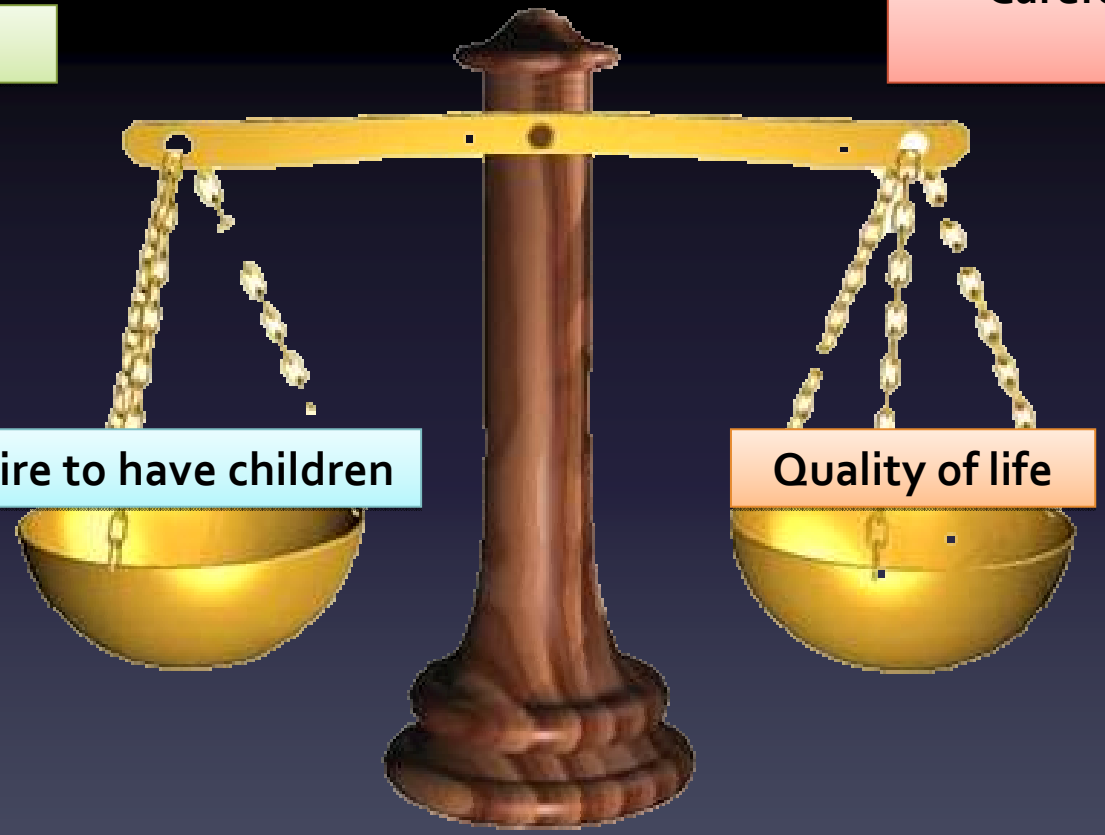
Role of lifestile in infertile patients with endometriosis

The role of lifestyle in infertile patients with endometriosis is still a controversial topic.

Take at home

Measure OR

Careful preoperative staging



Desire to have children

Quality of life

Adequate Counseling

Grazie per l'attenzione

"Essere mamma non è un mestiere. Non è nemmeno un dovere. È un diritto fra tanti diritti"

O. Fallaci