

"ARE LASERS BENEFICIAL IN GYNAECOLOGICAL ENDOSCOPIC SURGERIES ?"

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SUMMARY

Use of Lasers in our country has always been viewed with skepticism since Lasers are costly and trained consultants are rare. We present out pioneering work of 174 cases of Laser Endoscopic surgery done from August 94 till February 96 at the National Institute of Endoscopic Surgery and Laser foundation, Bombay and Jaslok Hospital, Bombay. We evaluated "Whether Lasers are really beneficial in Gynaecological Endoscopic Surgery ?"

One of the three different Lasers were used - Carbon dioxide Laser (Non contact), Diode Laser and Nd Yag Laser for Laparoscopic adhesiolysis, Endometriosis, PCOD drill, hyposalpinx, Myomectomy, Myolysis, LUNA and Hysteroscopic Laser ablation, incision of septum, intra-uterine adhesiolysis and myolysis.

We found carbon dioxide Laser with swiftlase facility was superior to all other modalities particularly in Laparoscopic surgery for infertility viz. Endometriosis, hydrosalpinx, adhesiolysis. Diode laser was easy touse for both Hysterolaparoscopic surgery. Nd Yag Laser was not suited ideally for infertility surgery as there was deeper tissue damage to normal blood vessels. In Hystetoscopic surgery, Laser endometrial ablation was not superior to resectoscopic TCRE.

In the hands of a skilled surgeon, Laser becomes an instrument capable of inducing desired therapautic effects far beyond the scope of cold knives, coagulators and electro surgery. However, Laser is just an instrument and not a complete treatmet modality.

INTRODUCTION

Medical advance always has a categorically bad past history, any new technology passes through phases of criticism, rejection, overenthusiasm, condemnation & finally to practical acceptance. Lasers are no exception.

Use of LASERS in our country has always been viewed with skepticism since lasers are costly, cumbersome, not portable and training facilities are inadequate. After proper training abroad and working with different types of Laser equipments in our country I present to you our pioneering work of 174 cases done in this field trying to evaluate "Whether Lasers are really beneficial in Gynaecological Endoscopic Surgeries.?"

In the hands of skilled surgeon, Laser becomes an instrument capable of inducing desired therapeutic effects, for beyond the scope of cold knives, coagulators & electrosurgery. Being largely hemostatic, lasers give an unmatched dry & clear field which the surgeon enjoys. Laser also enables him to reach structures whose size & location make them inaccessible to any other competitive surgical modality.

MATERIALS & METHODS

BASIC PRINCIPLE OF LASER

An atom stimulated by various means achieves an excited state, which decays back to ground state emitting a PHOTON. Photon moves in the direction of stimulator. Photons well aligned are called coherent, if they meet more photons in progression,

a chain reaction is set leading to AMPLIFICATION. When this event takes place between two reflective mirrors, one reflective & other partially reflective, transmitting 10% only, it generates an intense photon beam at the outlet utilizable by the surgeon. This is LASER - light amplification by stimulated emission of radiation. Laser thus is an ordinary light beam which is monochromatic, coherent, with low divergence angle.

We used three different types of laser machines for endoscopic surgeries.

1. Nd. Yag Contact Laser (Wavelength 1064 nm) used in predominantly contact mode by bare or sapphire tipped fiber. This can be used in fluid media and have good hemostatic effect.

2. Diode Contact Laser (Wavelength 805 nm) used in contact mode with bare or orbital tip or sidfiring fibres from a portable unit. This can be used for both laparoscopic & hysteroscopic surgeries through our standard accessories.

3. Carbon dioxide - non contact laser (Wavelength 10600 nm) used only in non contact mode with simple beam or swiftlase rotating beam attachment. This is absorbed by fluid hence not useful in hysteroscopic surgery. When used for laparoscopic surgeries protective back stop is needed. Due to rapid absorption by tissue it cuts by vaporising tissue.

One of these three different lasers were used alongwith a standard solid state electrosurgical unit for 174 Gynaecological endoscopic procedures done from Aug. 1994 till Feb. 96. (Table I)

Table I
LASER ENDOSCOPIC SURGERY

1)	Laparoscopic Adhesiolysis	39
2)	Endometriosis	31
3)	Polycystic Ovary - drilling	32
4)	Cuff neosalpingostomy & Fimbrioplasty	9
5)	LUNA (Uterosacral nerve ablation)	14
6)	Laparoscopic Myomectomy	8
7)	Laparoscopic Myolysis	3
8)	Endometrial Laser ablation	24
9)	Hysteroscopic Septal Incision	7
10)	Intrauterine adhesiolysis	5
11)	Hysteroscopic Myomectomy - myolysis	2
Total Number of cases		174

We evaluated critically the actual usefulness or superiority of laser (if any) over conventional hysteroscopic & laparoscopic surgical technics.

HYSTEROSCOPIC LASER SURGERY (38 CASES)

Contact laser either diode or Nd - Yag was used for hysteroscopic surgery as CO₂ is not useful in fluid media. We performed twenty four endometrial laser ablation usually with a orbital tip or a bare fibre (1000 Um) with a dragging touch techniq in a continuous mode at 35-60 watts output with either 1.5% Glycine, Ringer lactate or 5% Dextrose media.

For intrauterine septal incision (7 cases) or adhesiolysis (5 cases) a conical tip or bare fibre was used at 15-25 watts output. No major complications were encountered and the following observations were made.

1) Endometrial laser ablation was not

superior to TCRE specially in unprepared thick endometrium.

- 2) Identification of muscle fibre was difficult with laser as tissues are ablated.
- 3) Unlike TCRE no tissue was available for histopathology.
- 4) Operative hysteroscopy sheath used for laser did not maintain good uterine distension & vision compared to continuous flow resectoscope used for TCRE.
- 5) Both dragging or blanching techniq had an awkward angle of movement since the laser fibre is parallel to the uterine wall.
- 6) Operating time for laser ablation (50 minutes) was more than average time for TCRE (26 minutes).
- 7) Collins rightangle point electrode was easier and faster for septal

incision & adhesiolysis compared to lasers.

Thus no obvious advantages of lasers were noticed for hysteroscopic surgeries.

LASER LAPAROSCOPIC SURGERY

Polycystic Ovarian Syndrome - Drilling (32 cases)

A bare or conical tip fibre in continuous mode at 8-10 watts, was used through the standard second puncture - irrigation aspiration cannula. Depending on the size of ovary 8 to 20 holes were made with 600 Um fibre. Technically Laser was superior to electrocautery since no current goes through the ovarian tissue, area of thermal damage around the puncture site was minimal with lesser possibility of adhesions.

Out of the total of 96 cases of laparoscopic ovarian drilling done, 64 were done by electrocautery & 32 by contact laser. In the entire group we have 80% regularization of menstrual cycle & 46% pregnancy rate. Maximum results were within 6 - 9 months of treatment.

Daniel & Miller (1989) had 85 clomiphene resistant PCOD treated with KTP laser and had 71% ovulation & 56% pregnancy rate.

Abdel et al (1990) had randomised study of laparoscopic ovarian drilling compared with only gonadotropin therapy. The pregnancy rate were same, but pregnancy losses were less with laparoscopic ovarian drilling compared to only gonadotrophins therapy.

Laser Laparoscopic Adhesiolysis, Ovariolysis, Salpingolysis (39 Cases)

Contact laser with conical tip or bare fibre at 10-15 watts is useful. Major advantage of laser is simultaneous coagulation of small bleeder and it is extremely useful near vital

structures like ureter, bowels, vessels etc. with no risk of electrosurgical burns. We however had encountered excessive bleeding from omental adhesions on anterior wall in post surgical adhesions. This was controlled by bipolar cauterization.

When CO₂ laser was used in 8 cases, metal instrument were used as backstop.

Laser for Tubal Occulsion (9 cases)

In fimbrioplasty or hydrosalpinges for cruciate incision focussed beam of CO₂ 40 Watts was used with hook as back stop. For contact laser conical tip was preferred. To create a proper cuff eversion by swiftlase CO₂ laser at 10 watts was used. This technic has no comparable equivalent, both in contact laser or electrocautery.

Pregnancy rate in fimbrioplasty was better (52%) compared to that hydrosalpinx (25%). Thick walled hydrosalpinx were avoided in patient selection.

Laser in Endometriosis (31 Cases)

Mild endometriosis which was symptomatic or where no other cause of infertility was detected - Laser ablation was best done with swiftlase CO₂ laser 40-50 watts defocussed beam, contact laser at low wattage orbital tip (15-20 W) is useful.

Nowrozi (1987) noticed 60.9% pregnancy rate in patients of mild endometriosis treated compared to 18.5% pregnancy rate in groups where no treatment was given.

Ovarian endometrioma small (less than 3 cms) were drained with 40 W CO₂ focussed beam, followed thorough wash and vaporization of cyst lining by swiftlase CO₂ laser. The same protocol is followed for large endometrioma, however in few affording cases, GnRh agonist injection was given 2-3 months before a second look

ablation of cyst lining.

I would like to emphasize that as the endometriotic cyst is a pseudocyst of cortex it is unwise to peel of the cyst lining, since this removes healthy cortex, hence it is better to ablate this lining with controlled depth - swiftlase laser.

Pregnancy rate varied from 52 to 36% depending on associated pathology. Laser definitely caused minimal damage & maintained the anatomy with no risk of electro-surgical damage to surrounding structure.

Paulson et al (1991) found laser superior to electrocautery in mild to moderate endometriosis compared to other treatment modalities.

Laparoscopic Laser Myomectomy - myolysis (11 cases)

CO2 laser was useful mainly to make an avascular incision in fibroid capsule, however for hemostasis electrocautery or suturing is mandatory.

A bare fibre set at 60-80 watts in pulsed or continuous mode was used to make multiple punctures on fibroid at 7-10 mms distance to achieve myolysis in 3 cases not willing for myomectomy.

COMPLICATIONS OF LASER SURGERY

Though laser surgeries are supposed to have very high complication rate both for the patients and the operating team, we found this misconception not valid.

The following problems were encountered in 174 cases of Laser Gynaecological Endoscopic Surgery.

- 1) Excessive bleeding - in 5 cases Treated with conventional laparoscopic instruments and bipolar cautery or suturing.

- 2) One accidental injury to broad ligament vessel leading to a small hematoma was noticed with CO2 non-contact laser.

- 3) One case of uterine surface laser injury and bleeding while using focused beam to incise fibroid. Bleeding was controlled by bipolar cautery.

- 4) One case of serosal injury to bowel in a case of endometriosis treated with CO2 laser, conservative management was required.

In one case of polycystic ovary for drilling, laser could not be used due to technical malfunctioning of footswitch.

DISCUSSION & CONCLUSION

Laser have been, since a very long time, not evaluated to its full potential, primarily because of cost, non availability or lack of trained person to use the equipments.

Baggish & Chong (1981) found lasers to have less tissue damage, minimal scar formation & rapid healing.

However Kuciano et al (1987) in a rabbit model found no difference in depth of thermal damage or adhesion formation between CO2 laser & electrocautery.

We evaluated the usefulness of three different lasers in 174 cases of operative laparoscopy & hysteroscopy as the initial pioneering work in a zone previously not invaded.

Lasers have been definitely more versatile, hemostatic and gave an unmatched clear field even at areas inaccessible by any other competitive surgical modality, yet there are dangers of accidental injuries to other organs. Further availability of laser does not obviate need of a good electro-surgical

unit to control bleeding.

In our study, of the 174 cases of laser endoscopic surgeries, the following were observed :-

1) Hysteroscopic laser ablation was inferior to resectoscopic TCRE particularly in our country where endometrium is thick & unprepared.

2) Similarly in intrauterine septal incision & adhesion, resectoscope was better than laser and had less operating time.

3) Noncontact CO2 laser was excellent in cutting tissue with hemostasis however needed a backstop to prevent accidental injuries.

4) Portable contact laser units were effective & useful both for hysteroscopic & laparoscopic surgery. Diode laser was more cost effective, however, Nd Yag laser had better hemostatic effect.

5) Swiftlase CO2 laser was extremely useful for ablation of endometriotic cyst lining & also on endometriotic spot on vital structures like ureter, bowel, bladder, vessels, etc. Swiftlase offered precise, superficial, layer by layer, char free ablation which was superior to contact lasers & electrocautery.

6) Laser were marginally better in polycysticovarian drilling, less useful in laparoscopic myomectomy compared to electrosurgery, but more versatile for adhesiolysis & correction of terminal tubal occlusion with no obvious danger of electrosurgical damage to surrounding structures.

7) In the hands of a skilled surgeon lasers can give cutting edge with unmatched tissue effect in laparoscopic surgeries, but the cost involved makes laser only an institutional purchase for multidisciplinary use to make it cost effective. Finally we should remember LASER IS JUST AN INSTRUMENT & not a complete treatment modality.

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