

INDURATIO PENIS PLASTICA (IPP) AND LASER : A REVIEW

Longo L, Mancini St, *Postiglione M

General Surgery Institute and Phlebology Center – Siena University
*Institute Laser Medicine Florence – Italy

ABSTRACTS

The first employments of Laser therapy for I.P.P. came from back to more than twenty yeas ago. At the beginning it was employed only in the acute forms as analgesic later laser was used also as anti-inflammatory following the doses of Low Level Laser Therapy . Than the science tried to use the laser effect remodelling phase of the scars, to make the fibrosis regrade in the chronic forms.

Tunable laser in small optical fiber was used for ablation of calcified zones with very good results.

For the slight forms were used diode laser 660 and 904 nm, alone or coupling with CO2 laser with large spot. At first some Author used helium-Neon laser 632 .Some of these lasers were combined with microiontophoresis and ultrasounds therapy in the same treatment.Now we use 810 nm surgical diode laser in almost all induratio forms.

The immediate results and the follow up will be discussed.

Thanks to these results we could conclude that IPP laser therapy can be effective in most of the clinic forms.although the used tprocedure is subject to improvement.

Keywords: induratio penis plastica, non-surgical laser therapy, recurvatio, plaque, fibrosis, diode, echographic findings

1. INTRODUCTION

Induratio penis plastica is an increasing pathological condition with men, who are middle-aged and advanced in years, tending to be at a higher risk than others^{1,2,3} .

This pathology is included in the group of the collagenopathy, as rheumatic disease.

Often it is related more to the Dupuytren Syndrome than to the Ledderhose disease.

Some suggestions relate it to the hyperglycemic conditions and to diabetes, and/or auto-immune pathogenesis but the exact pathogenesis of this connection is not known yet^{4,5,6} (table 1).

Induratio penis plastica is, however, placed in the rheumatic pathologies even if it is diagnosed more by urologists and dermatologists, since the patient requires their medical advice and not that by rheumatologists and andrologists.

According to the eziology^{1,2,3,4} we can distinguish primary idiopathic and/or degenerative and secondary to trauma o recurrent diseases or iatrogenetic

According to the pain-lenght we find different levels of induratio pain: acute, subacute, chronic.

In the pathogenesis we have inflammatory,degenerative and mix phases (table 2) .

Morfologically, we can distinguish patches, nodes, filaments which can be linear and circular⁴, and which are evident by ecography and checked both in restful position and in spontaneous or caused erection.

“Primus movens” seems to be a microvasculitis of the albuginea (table 2).followed by apposition of fibrin which is not intaken but stimulates a chronic irritation with a new apposition of collagen and the following cicatrization which is, clinically, responsible of the recurvatio^{2,6}.

Sometimes there is an apposition of calcium⁷.

The first clinical symptom may be a dolentia or a pain in the erection, but this pain could be absent in the first phase.

Another symptom is the sensation of difficult or reduced erection due to the pain and to the mechanical compression of patches and of nodes on the vessels and on the neuroterminals.

The principle symptom is the recurvatio which leads to the "impotence coeundi" both for mechanical and for psychological causes.

Moreover, it is just this recurvatio the patient complains about more often.

The diagnosis requires the penis clinical characteristics, echography in restful position and in erection.

It should be better make a check-up to estimate the erectile ability of the patient.

A radiography should be required in case of calcific induratio.

As therapy there have been many suggestions as the pharmaceutical substances, as POTABA, DMSO, PTH, procarbazine, Cortisone, Vitamin E, vesseldilator, prostaglandins but with partial or poor results, while the side effects of the substance in therapeutic dosage are often important.

There has been suggested the colchicine recently, however, it causes gastroentorologist discomforts; and even some physiotherapies as ultrasonics, ionophoresis, microiontophoresis, the low-frequency electrostimulation and only recently the shockwaves.

But no one of these has been recognized as efficacious in most cases.

Other pharmaceutic drugs have been injected topically, as cortison, orgotein, graphites reporting some positive result.

Surgery has suggested different types of intervention more or less harsh, but often with no result and in some cases they ended to be worst.

It is better to keep in mind that the degenerative forms are a kind of collagenpathia so the cicatrization cannot be regular.

Lasers have been used both for therapeutic non-surgical and for surgical aims^{7,8,9,10,11}.

The laser therapy 904 nm has been successfully used not only with the medical therapy but also with the ultrasonics and ionopheresis.

Other wavelenght used: 632, 660, 810, 830, 950 nm.

We can say that no a single codified therapy has been efficacious in most cases.

2. MATERIALS AND METHODS

Since 1984 we have been treating 101 patients who are in middle-aged and advanced in years with a non-surgical laser therapy treatment.

The patients were treated in our consulting room of Florence and in Siena University consulting rooms.

The patients were divided into several groups in relation of the type of induratio (table 3)

Before the treatment the patients have undergone an erectile test which resulted positive.

At the beginning, other Authors used a helium-neon laser⁸ (wavelength of 632 nm).

Until 1995 we have used a Diode laser of 904 nm and a laser CO2 in association, then 660 nm for two years^{9,10,11}, and since 1998 until now we use laser diode 810 nm 30 W of power CW and large spot-size (table 4).

The treatment consisted in the irradiation of the patches daily, taking care even of the adjacent healthy textures and the penis base.

The dosage for spot varied from patient to patient and it was included in a range of 4 and 20 Joules/cmq.

We have used pulsed Diode laser with a frequency of 3.600 Htz and with irradiation on fix points.

The ray's diameter varied from 1 to 5 cm.

The specific dosage for each patient had been settled taking into account the clinical aspect of the lesion under the treatment.

With a low-power diode laser only by a mild change of colour of the area we thought to have reached a maximum dosage, while with high-level diode laser and with laser CO2 the patient himself suggestes when the

application should be finished, since he feels a sensation of local heat which at first it could be relieving but at last it ended to be fastidious and this is the point to stop the action. Then we calculated the average of the dosage for spot irradiated for each patient.

The length of each application varies with the power of lasers available.

The stronger are the lasers, the shorter will be the applications' time required to reach the therapeutic dosage of Joule.

Studies on the laser biostimulation of the cicatrization have confirmed that the energy density around 4 joule/cm² with visible red wavelength and 3 joule ca. The infrared could stimulate the textural repair increasing the proliferation of the fibroblasts and the reapposition of collagen.

In the case of induratio fibrosa our aim is exactly the opposite and we can reach it with the same laser type increasing the irradiation dosage to 20 Joules/cm².

Above this it could appear microburn conditions.

Used medium dosage varied from 8 to 20 Joules/square cm.

Always make an echography of the penis before the treatment and after twenty days ca.

In fact, if the echography is made within twenty days from the last application it is not possible to distinguish any structure, since the textures seem to be permeated of a widespread hyperechogenicity as fog-screens and it does not allow any diagnosis.

These echographic changes are due to the effect of the laser irradiations which trigger a distribution of the fluids at the level of microcirculation of the irradiated area.

The irradiation has been carried out on the patches/nodes and at the basis of the penis on every side.

If we use laser with automatic scanner devices we regulate the scanner to a speed of 1 cm per second and the dosage must be estimated taking into account this further variable parameter.

The combined substances should be suspended.

We used a tunable laser only in case of calcified plaque, but in these patients we make a minimal surgical intervention already described in other personal publications^{7,9}

3. RESULTS

The results have been recapitulated in the chart (table 5).

In the reckoning of the results we should consider the following parameters: presence/absence of recurvatio, measurement of patch/node under echographic check-up, presence/absence of pain and/or phlogosis.

The patients were divided in four groups following the results obtained: no-results (no group), improvement of one parameter above described (less group), improvement of two parameters (good group) and improvement of all parameters with disappearance of the clinical and echographic findings (excellent group).

Patients have been followed for 1 year after the cycle of applications.

The echographies have been made at first after one month, then every six months and 1 per year.

Evaluating the results we must remember that about 5-15% of Induratio penis plastica have a spontaneous remission^{1,2,3,9}.

Echographic findings confirmed the positive results of the clinical features (fig.1 and 2).

No substantial differences have been observed between the groups treated with different kinds of lasers and the percentage of positive results in each group, so we show on table 5 the summary of the results obtained on all patients, independent by the kind of laser used.

It has been observed that the form of induratio with circular patches or with the major horizontal axis are the less treatable forms.

As for the etiology is regarded, we can say that post-traumatic forms have much better prognosis than those who are degenerative.

The age of the patient and the period of the manifestation of the patch don't seem to influence significantly on the achievable results.

In most cases we can obtain the stability of the results by the follow-up (table 6).

The relapses has been treated with another cycle of applications; the same treatment has been used for those patients which showed results below the 50% of improvement. But these patients with relapses or partial results treated again with another cycles of laser applications were not included again two times in table 5 .

4. DISCUSSION

Laser's effects on the cicatrization are partially confirmed^{12,13,14}.

However, it is still to show what kind of laser and what dosage reach the better efficiency.

Infact, it's the dosage itself to be responsible of the effectiveness in the same way of lesion and type of laser¹⁵

There seem to be a range of wavelenghts from visible to infrared and able to flatten the scars and block the fibroblasts production.

This datum can be seen better in vitro.

In these cases, we still don't know if the importance of the wavelenght could be above the dosage (seen as relation between used power, exposition time and irradiated area)

It's important to know how to administer the continued or pulsed radiation and the characteristics of the impulses.

However, we can't draw any definite conclusion.

In laboratory the low power laser irradiation increases expression of FGF during healing of cutaneous wounds in normal and diabetic psammomys obesus¹⁶. On the other hand it's confirmed that some substances used in the cicatritial modelling process as the metal-proteinasis, increase even of the 80% after every laser application 810 nm on hypertrophic scars¹⁷.It may occur the same thing in case of fibrous patches and of nodes on the induratio, even if there are no biopsies which can confirm this

But the clinic demonstrates that there occurs a modelling of textures struck by induratio penis plastica. And it's the maximum elasticity of the irradiated wounded areas that we can see after 3 o 4 applications.

In case of acute phlogosis, the inflammation itself tends to disappear after few laser applications.

We still don't know the reason why the positive effects don't occur in all cases.

Probably it's important not only the place and the form of the patch, but also its own composition.

Maybe the complex patches or nodes are not easy to be treated with a laser dosage used for others.

However, increasing the dosage there's the risk of increasing the scattering and the burn of healthy textures, also for the pearl-like colour of the texture which can radiate the laser to the nearby textures.

Probably this phenomenon of scattering and poor intake of the radiation is more marked in the complex fibrous textures.

5. CONCLUSIONS

Lasers seem to have a positive and a reinforced role in the treatment of induratio penis plstica. But the action's devices should be still studied with further applications and we should decide the type of laser and the most efficacious dosage.

Poor effects are not obtained in any patients. The negative effects were limited at the persistence of the clinical and echographic findings, but all patients presented a block of the negative evolution of the pathology.

The reached results are good and stable in most cases.

The patients with calcified plaque treated with tunabble lasers were the total disappearance of the plaques and absence of replapses. But the less number of patients treated induces prudence in the conclusions.

Further studies are useful to confirm definetely these data and to codify this method of treatment of induratio penis plastica.

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Correspondence:

Leonardo Longo, MD

Borgo Pinti, 57 – 50121 Firenze – Italy

Fax 00390552342330 Email longo@dada.it ; www.ialms.com ; www.longolaser.it

Fig. 1 – Echographic findings bfore and after diode 904 nm laser treatment

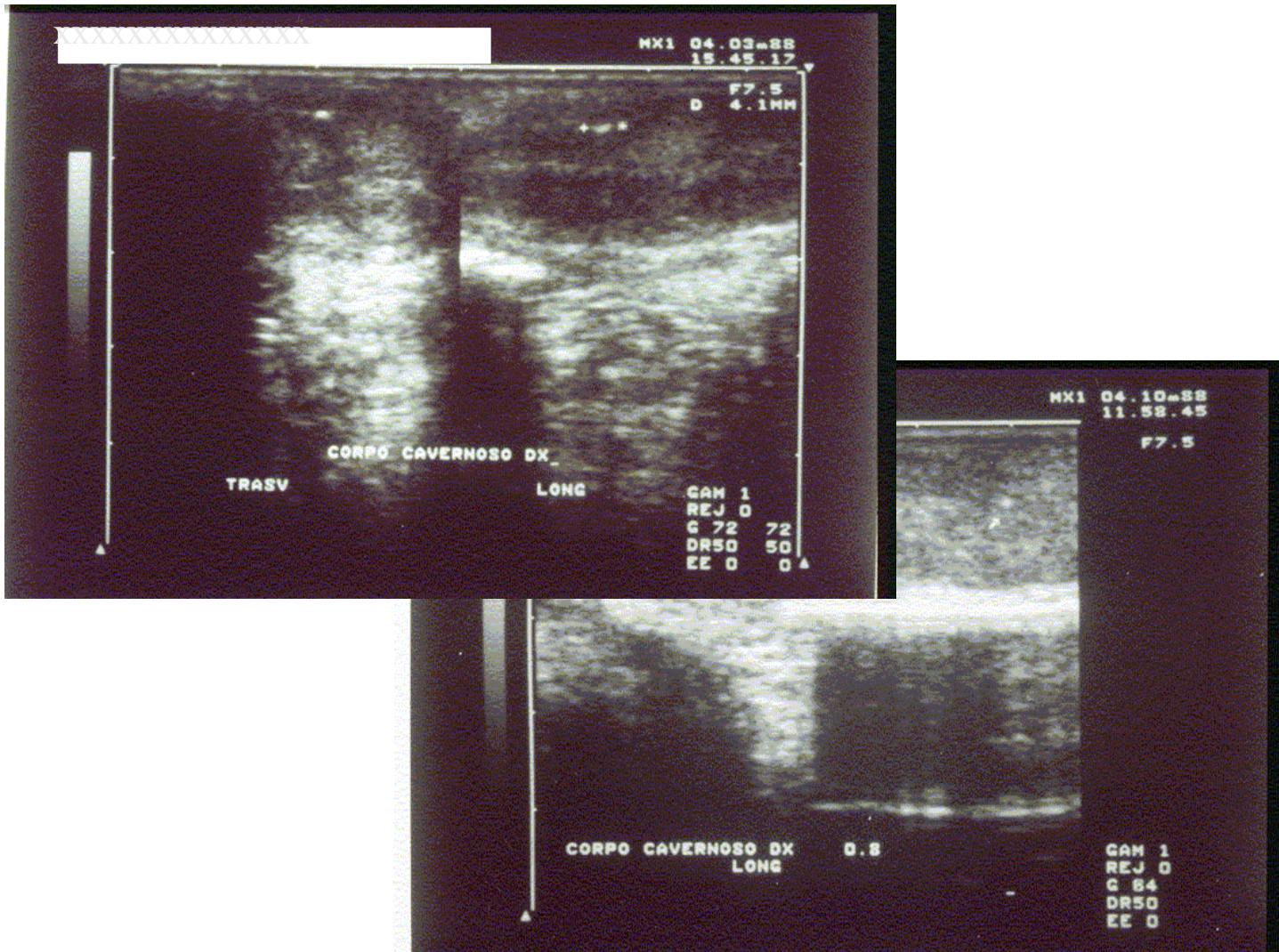


Fig. 2 – Echographic findings before and after diode 810 nm laser treatment

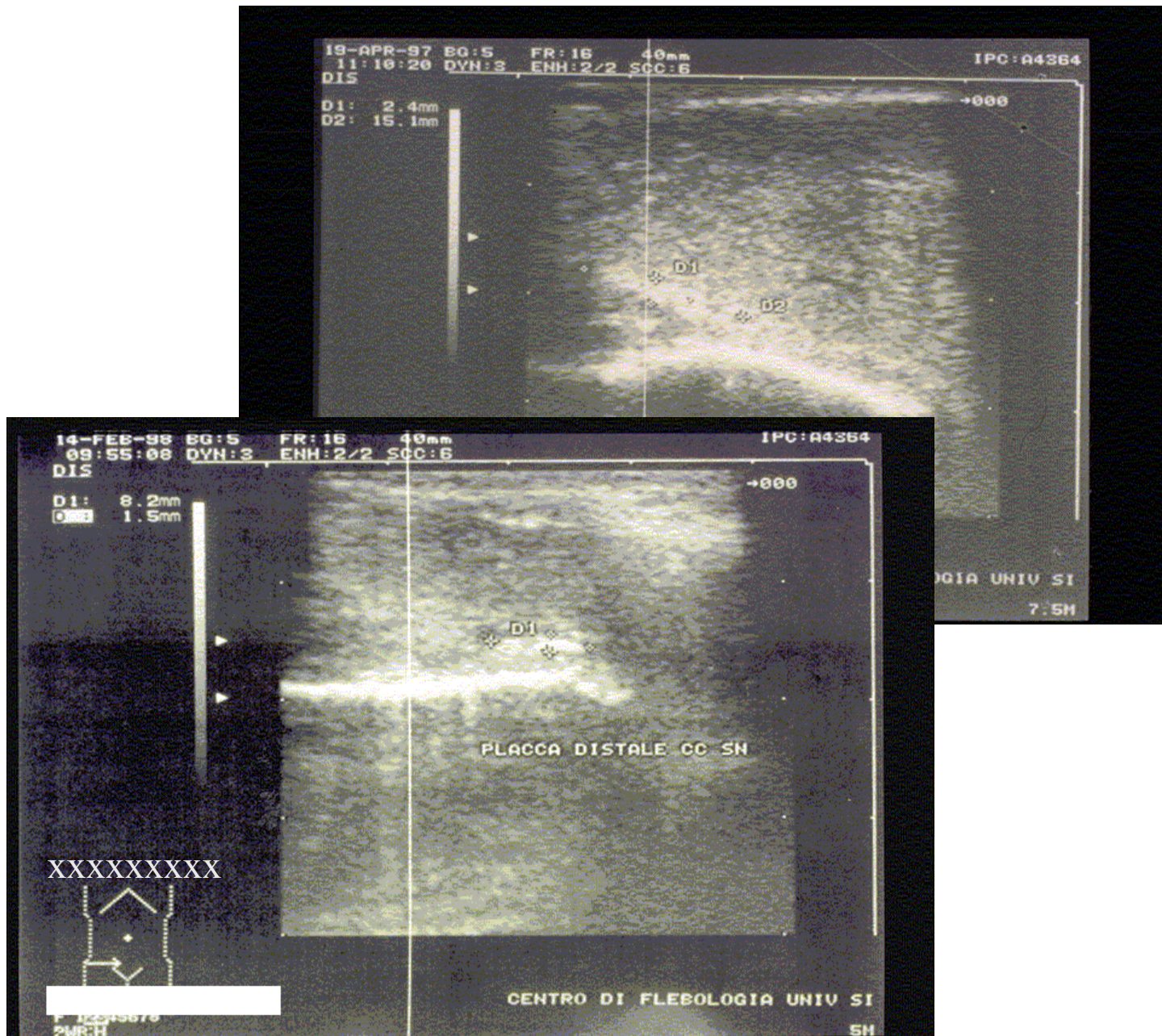


Table 1 - Pathogenesis

- Vasculitis of albuginea
- Exudative Phlogosis
- Deposit of fibrin
- No reabsorption
- Organization of the fibrin
- Fibrosis
- Loss of elasticity
- (Calcification)

Table 2 - Clinical findings

| ACUTE IPP | CHRONIC IPP |
|------------------|---------------------------|
| • Erythema | • Nodules, plaques, lines |
| • Pain | • Recurvatio |
| • Paresthesias | • Impotentia coeundi |

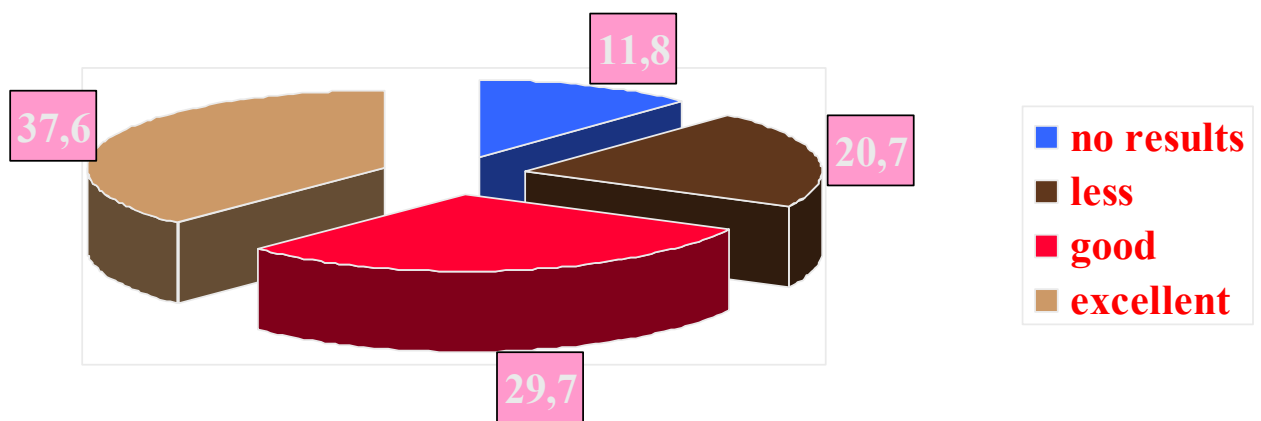
Table 3 - Patients selection

- Middle age
- No smoker
- Recurvatio present since one month
- Interruption of other therapy associated

Table 4 - Doses

| Parameters | CO2 | Diodes | |
|--|-------------------------------------|--------------------|------|
| Wavelength - <i>nm</i> | 10600 | 904 | 810 |
| Emission | PW | PW | PW |
| Spot size - <i>mm</i> | 3-10 | 3-6 | 50 |
| Fluence - <i>Joule /cm²</i> | 4-8 | 4-8 | 8-20 |
| Repet. Pulse Frequency <i>Hertz</i> | 100 | 3000 | 3000 |
| Irradiated points (zones) | <i>Lesion & adjacent tissue</i> | | |
| Procedure of irradiation | <i>Scanner</i> | <i>Fixed point</i> | |
| Nr. & rythme of sessions | <i>15 - Once a day</i> | | |

Tab 5 - Patients treated : 101



Tab 6 - Follow up after 1-6-12 months

% of RELAPSES

