Rezumat

Tratamentul chirurgical ambulator cu radiofrecvenţă al afecţiunilor chirurgicale ano-perianale benigne

Introducere: Incidenţa afecţiunilor chirurgicale ano-perianale (ACAPB) este în creştere. Radiofrecvenţa (RF), ca metodă terapeutică chirurgicală, foloseşte unde radio de frecvenţă înaltă pentru incizie, excizie şi coagularea tisurilor. Obiectivul studiului este de a demonstra posibilitatea de a utiliza RF în tratamentul chirurgical ambulator al ACAPB cât şi eficienţa acesteia comparativ cu alte tehnici chirurgicale.

Material şi metodă: Studiul retrospectiv a fost realizat pe o perioadă de 11 ani (decembrie 2003 - decembrie 2014), în Centrul Medical Internaţional “Proctoline” din Bucureşti (România), pe un lot de 783 pacienţi, operaţi cu RF pentru 10 tipuri de ACAPB, în condiţii de ambulatoriu. S-au practicat intervenţiile chirurgicale cu RF, sub anestezie locală, de tipul: tommii, ectomii, excizii, curetaje, etc.

Rezultate: Durata intervenţiilor nu a depăşit 45 de minute, iar durata de vindecare totală a variat între 7 şi 45 de zile post-operator. Rata complicaţiilor minore este mică (8,3%). S-au înregistrat rezultate foarte bune postratament (la max. 11 ani), pacienţii prezentându-se la controale periodice la 1 şi 4 săptămâni.

Concluzii: RF este o metodă foarte eficientă, rapidă şi sigură de tratament al ACAPB în ambulatoriu, utilizată doar cu anestezie locală, oferind pacientului un minim disconfort postoperator şi o regenerare tisulară rapidă, estetică şi funcţională în timp. Comparativ cu metoda „clasrică” chirurgicală, complicaţiile sunt minore şi cantitativ scăzute.

Cuvinte cheie: radiofrecvenţă, afecţiuni chirurgicale ano-perianale benigne, ambulator, anestezie locală

Abstract

Introduction: Nowadays, the occurrence of surgical benign ano-perianal diseases (SBAPD) is raising. Radiofrequency (RF) represents a surgical therapeutic method using high frequency radio waves to perform incisions, excisions and tissue coagulation. The main purpose of the study is to validate the possibility to use RF within the surgical treatment for outpatients with SBAPD; at the same time, a special consideration has been given to appreciate the efficiency of RF compared with other surgical methods.

Material and method: The study presents the results accumulated...
The use of electricity in surgery started with a spark generating and/or coagulation of tissues. Waves of high frequency (3.8-4.0 MHz) for cutting, excision, and functional recovery of wound. By comparison with “classical surgery”, the complications are rather minor ones and their percentage occurs in a lesser one.

**Key words:** radiofrequency, surgery in benign ano-perianal pathology for outpatients, local anesthesia

## Introduction

The surgical benign ano-perianal diseases (SBAPD) includes several widely spread affections. The impressive frequency of SBAPD is now increasing, thus revealing the consequences of modern life (inadequate nourishing, stress, sedentary life, etc) thus, lately getting a social aspect; for instance, the haemorrhoidal disease can be met at 60% to 80% from the adult population (1). SBAPD can be responsible for important physical or psychic nuisances with a major potential for natural evolution towards redoubtable complications or sequel, occasionally producing infirmities (2).

The consequences as well as the unsure results and the implied sufferings characteristic after ‘classical” surgical interventions in anal sphere have produced significant changes in the treatment of these diseases; the adjustments of classical methods were due to the recent discoveries related to pathogenicity of anal syndromes. The great majority of these new methods are nowadays performed in ambulatories, under local anesthesia, being relatively non-painful, without obvious complications and leaving the patient engaged in his current activities (2).

One of these novel techniques is the AMBULATORY PROCTOLOGIC RADIOSURGERY; this system uses radio waves of high frequency (3.8-4.0 MHz) for cutting, excision and/or coagulation of tissues.

### A short history

The use of electricity in surgery started with a spark generator (1907), continued with coagulation units (1909) up to the first electro-surgery devices (1928); all of them were characterized by a dispersion of a high amount of heat. The used frequencies were in the range 0.5 to 2 KHz, producing serious burns on neighboring tissues (3).

D'Arsonval (French physicist and physiologist 1851-1940) has performed the first tests regarding the use of RF currents on human body; Heinrich Hertz (German physicist 1857-1894) had manufactured a device that produced high frequency currents, overtaking the barrier of 10 KHz (4). In 1950 Dr. Leonard Malis developed the first “bipolar” device, where two electrodes were used for holding of tissue. (5). Tests performed on some mammals (rats, pigs, Rhesus monkeys) have proved that exposure to radiofrequencies is entirely compatible with life (4).

Dr. Arthur A. Goldstein (Monaco) introduced the word “radiosurgery” so that to differentiate the device invented in 1969 (Irving Ellman) (6) using high frequency radio waves (3,8 MHz) from “electrosurgery” characterized by low frequencies (0.5-2.9 MHz); both methods have been used in treating various affections of soft tissues (3). Moreover, A. A. Goldstein has founded (1974) the International Academy for Radiosurgery (3).

Nowadays, radiosurgery (radio waves at 4 MHz) allows the heat control leading to cell vaporization and, in general setting, the right parameters letting the attaining of first-rate results.

The main purpose of this paper is to highlight the possibility to use RF in the surgical treatment of SBAPD in ambulatory, using only local anesthesia; at the same time, we have put into evidence the efficiency of RF within the above-mentioned conditions.

### Material and Method

The study covers the period December 2003 – December 2014; all interventions took place in “Proctoline” – Bucharest on a number of 783 patients. The study followed the principles of medical ethics, according to Helsinki Declaration of World Medical Association, as well as the Oviedo Convention of European Union.

Criterion for inclusion in the present study: SBAPD that cannot be cured only under conservative (medications, hygiene-and dietetics) treatment and accordingly implied a minimal-invasive intervention, using RF, under ambulatory conditions.

SBAPD categories included in the study are presented alongside with the subsequent RF procedure: the main data are shown in Table 1.

### Criteria for exclusion from the study:

1. Holders of the old type unshielded cardiac stimulators (peacemakers); it is known that RF may produce electromagnetic interference. (3)
2. Patients having implanted cardiac defibrillators; RF may generate arrhythmia (3).
3. Patients with neglected or complex SBAPD (i.e. inter-
nal hemorrhoids of 4th degree, complex perianal fistulas etc) or severe local complications.

4. Pre-cancerous proctologic lesions (dysplasia) or malign tumors.

The particularities of the group and its peculiarities are presented in Table 2; also, we have identified the existing predispositions factors, generally favoring SBAPD.

Patients treated with RF surgery had 19 to 82 years old, the average age was 46 years.

The following data have been examined: clinical observation sheets; proctological examination; paraclinic investigations (videoanoscopy; EDI, trans-anal and abdominal ultrasonography; sometimes EDS, CT or IRM; surgical protocols; hystopathological results).

The main recorded data were: intervention type and duration; operative complications; postoperative evolution; medical leave – days; healing interval; the treatment efficiency in time (1 – 11 years) and recurrences. All interventions were performed using two radio-cautery pencil at 3.8-4.0 MHz, namely, “Surgitron-F.F.P.FEMC” from ”ELLMAN” (see Fig. 1)

**Table 1.** Various types of SBAPD, included in the present study and the corresponding RF interventions

<table>
<thead>
<tr>
<th>Type of SBAPD</th>
<th>Type of intervention using RF</th>
<th>Number of interventions (783)</th>
<th>Percentage of interventions (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Anal fissure</td>
<td>Curettage</td>
<td>265</td>
<td>33.84 %</td>
</tr>
<tr>
<td>2. Skin tag</td>
<td>Excision</td>
<td>161</td>
<td>20.12 %</td>
</tr>
<tr>
<td>3. Perianal fistula (subcutaneous and/or low inter-sphincter / trans-sphincter fistula)</td>
<td>Fistulotomy or fistulectomy</td>
<td>100</td>
<td>12.77 %</td>
</tr>
<tr>
<td>4. External haemorrhoidal thrombosis</td>
<td>Thrombectomy</td>
<td>48</td>
<td>6.13 %</td>
</tr>
<tr>
<td>5. Superficial and marginal ano-rectal abscess (subcutaneous, low intersphincteric)</td>
<td>Excision</td>
<td>44</td>
<td>5.62 %</td>
</tr>
<tr>
<td>6. Benign ano-rectal polyp (fibroepithelial)</td>
<td>Polypectomy</td>
<td>41</td>
<td>5.24 %</td>
</tr>
<tr>
<td>7. Granulation in ano-rectal tissue (subsequent to “classical” surgery)</td>
<td>Excision and/or curettage</td>
<td>37</td>
<td>4.73 %</td>
</tr>
<tr>
<td>8. Benign ano-rectal tumor (hypertrophic anal papilla, lipoma, papilloma etc.)</td>
<td>Excision</td>
<td>35</td>
<td>4.47 %</td>
</tr>
<tr>
<td>9. Perianal and/or ano-rectal condyloma (benign pseudo-tumor) - HPV</td>
<td>Excision and/or curettage</td>
<td>17</td>
<td>2.17 %</td>
</tr>
<tr>
<td>10. Externally swollen hemorrhoids (varicose)</td>
<td>Excision</td>
<td>15</td>
<td>1.91 %</td>
</tr>
</tbody>
</table>

**Table 2.** Particularities of the group studied and the existing predispositions factors

<table>
<thead>
<tr>
<th>Group studied</th>
<th>Sex</th>
<th>Origin</th>
<th>Nxious factors – existing predispositions to patients included in study</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>M</td>
<td>Rural</td>
</tr>
<tr>
<td>783 patients</td>
<td></td>
<td></td>
<td>333</td>
</tr>
<tr>
<td>100%</td>
<td>42.53%</td>
<td>57.47%</td>
<td>7.92%</td>
</tr>
</tbody>
</table>
and “Kentamed” (Fig. 2), respectively; all procedures were done under ambulatory conditions with local anesthesia (lidocaine - 1%).

The surgery team consisted in proctologic surgeon and medical assistant. Post-operative clinical evaluation took place at 1 and 4 weeks; in selected cases every time is necessary.

Results

Time of surgical procedure has been in the range 5 to 45 minutes, while complete post-operative healing took place between 7 and 45 days. Occasionally, minor post-operative complications have been needed, i.e. oral analgesics or anti-inflammatory ones (2-7 days), disinfectant baths (5-10 days), local applications of cicatrizing ointments (2-4 weeks) or dressings. In general, post-operative complications were minor ones (see Table 3), in 8,3% of cases (65 patients).

The main reasons for postoperative complications are constipation, diarrhea, intense physical effort, alcohol, unsuitable feeding (especially the piquant food), stress, influence produced by other diseases like irritable bowel, acute HTA, post IMA, advanced DZ, viral B or C hepatitis, severe ones, compensated hepatic cirrhosis, cardiac prostheses, bypasses, post AVC, post-transplant i.e. kidney, liver status.

During the study, we did not record situations of post-operative wound supra-infections, or anal incontinence. All operatory pieces have been submitted to histopathological examination, the results showing benignity in all cases. In addition, all patients benefited from colonoscopy.

The following photos present selected SBAPD (already mentioned in Table 1) from the group. In this respect, we have presented the initial (preoperative) situation, images taken during interventions (intraoperative), photographs immediately post-operator (p/o), as well as postoperative results after various times.

Discussion

Despite a vast amount of data published in literature (7), a complete, methodical and comparative analysis regarding soft tissues treatment using various types of energies is not yet available.

Nowadays, beside RF, there are various options for surgical treatment of SBAPD: a) electrosurgery; b) cryosurgery; c) surgery using plasma; d) ultrasonic surgery; e) surgery using lasers (CO2, Nd-YAG etc.); f) infrared coagulation; g) last but not least - “classical” surgery.

RF presents some essential advantages (6) in comparison with other surgical methods in the treatment of SBAPD (8):
1. Incision and coagulation take place simultaneously.
2. The neighboring (lateral) tissue does not suffer important changes due to a reduced heat during intervention.
3. Hazard of post operatory infection is highly reduced, due to the sterilization effect. We have to mention that there are sterilization devices using RF.
4. Incisions may take place without pressure; this way, surgeries on very thin and/or mobile tissues become possible.
5. From the microscopic point of view, a wealthier neo-vascularization, as well as a delay of fibroblastic phase has been noticed; these facts are beneficial for a rapid and esthetic tissue recovery.
6. The artefact for biopsy is compressed (absorption 0.02 mm).

A study (9), using transmission electron microscopy (TEM), has shown different damages produced in neighboring tissues by the heat produced; these results mainly depend on the used medical technology and radiosurgery is the less...
Figure 3. *External haemorrhoidal thrombosis - thrombectomy*

1. Preoperative aspect
2. Intraoperative: thrombectomy
3. Thrombus
4. Postoperative (p/o)
5. 30 days later p/o

Figure 4. *Haemorrhoidal skin tag - excision with RF*

1. Preoperative
2. Post RF excision
3. Excised skin tag
4. 20 days later p/o
5. After 40 days p/o

Figure 5. *Chronic anal fissure - curettage with RF*

1. Preoperative
2. Postcurettage
3. After 14 days p/o
4. After 28 days p/o
5. 45 days later p/o
**Figure 6.** Simple perianal fistula - fistulectomy with RF

1. Preoperative
2. Postfistulectomy
3. After 30 days p/o
4. Excised fistula
5. Fistulous tract with sclerolipomatous tissue

**Figure 7.** Superficial and marginal ano-rectal abscess - excision with RF

1. Preoperative
2. Postoperative
3. Excised abscess
4. After 2 weeks
5. After 4 weeks

**Figure 8.** External dilated (varicose) haemorrhoid with adjacent ulcerous anal papilla - excision with RF

1. Preoperative
2. Intraoperative
3. Post RF excision
4. Excised hemorrhoid
5. After 21 days
6. After 42 days
Figure 9. Benign anal (fibroepithelial) polypus - excision with RF

1. Preoperative  
2. Intraoperative  
3. Post RF excision

Figure 10. Small benign ano-perianal tumor - hypertrophic anal papilla (HAP) - excision with RF

1. Preoperative  
2. Clamped HAP  
3. Intraoperative

Figure 11. Small benign ano-perianal tumor - lipoma - excision with RF

1. Preoperative  
2. Clamped Lipoma  
3. Post RF excision

4. Excised lipoma  
5. After 30 days p/o
damaging procedure among electrosurgery or different type of laser (Laser KTP-532, laser Nd-YAG, laser CO2).

It has been noticed that high frequency (used in Ellman's radiosurgery) meets a lower tissue resistance; this way it produces a lower penetration when comparing with the low frequency (electrosurgery) and/or laser (9).

In this respect, another evaluation of RF (4 MHz) in comparison with other conventional surgery techniques used in proctology is illustrated in Table 4 (10 – 19).

This fact might be understood as high radio frequencies (3.8 – 4.0 MHz) would generate less heat at tissue level. On the contrary, low frequencies (as used in electrosurgery) encounters a higher resistance, thus producing more heat in a greater depths. In turn, this circumstance would produce a higher damage/necrosis at cellular level on the incision lengths of course, collateral effects are edemas, pain, limphorea and a longer healing duration (20).

Among electromagnetic waves (EMW) used in surgery, RF implies a longer time than other EMW, with the purpose of generating heat in tissues. Numerous papers have shown that RF are the most efficient radiations(5).

Dr. P.G. Gupta and others, based on their practical knowledge withstand the advantages of using RF in the treatment of perianal fistulas, anal fissures, internal hemorrhoids or other SBAPAs, in comparison with other surgical methods of cure (21-25).

As known, radiosurgery may include monopolar or bipolar applications. We have to underline that the first RF interventions in the group studied, have been performed only in the monopolar conditions (with radiosurgical electrodes, later with
the monopolar “Stan” clip); subsequently, the more elaborate or difficult interventions (i.e. fistulectomy, excision of simple perianal abscesses, excision of external swollen hemorrhoids etc.) have been done with the bipolar clip, or both. The bipolar application allowed a significant decrease of intervention time that, in turn, determined a lessening of anesthetic (lidocaine). Moreover, when using the bipolar technique no suture threads were needed and the amount of lost blood is quite insignificant; our results have also been confirmed by other studies (5).

Nowadays, many surgical domains (general surgery – including the laparoscopic one, oncologic surgery, neurosurgery, gynecology, dermatology, esthetic surgery etc.) successfully use radiosurgery. As there are more and more medical energetic methods for tissues, and taking into account the availability of hybrid technologies, the surgeon has the thorny task to choose the most suitable method for his patient (7).

Conclusions

1. We may appreciate the position of proctologic radiosurgery as being a major one in the treatment of SBAPD; it can be successfully used in ambulatory, using only local anesthesia. Proctologic radiosurgery (PRS) represents a very efficient, rapid and safe method, introducing merely a minimal post-operative discomfort and a tissue recovery, both rapid and esthetic with minor complications.

2. Under the conditions of modern society, treatment as outpatient is easy to be accepted, the versatility and the excellent results of this technique leads to a good compliance of the patients to surgical treatment.

References

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