THE SURGICAL MANAGEMENT OF THE ACUTE ISCHEMIC INTESTINAL SYNDROME

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SUMMARY:
The ischemic intestinal syndrome represents the totality of clinical manifestations caused by total or partial, abruptly or slowly reduction of the intestinal circulation. The diagnosis made by laparoscopy was very useful in critical patients with suspicion of mesenteric intestinal infraction but with an irrelevant clinical picture. Between 01.01.2003 and 01.07.2005 in First Clinic of Surgery from University Hospital Timisoara, there were 5549 patients which underwent operations. From this total 12 patients, representing 0.21%, underwent operations for intestinal infraction. All the patients were hospitalized and operated on emergency, after a minimum of biological and pre-operative investigations, which are compulsory before an operation of such magnitude. Most of the cases had intestinal resection (9 cases), with termino-terminal anastomosis (5 cases), and latero-lateral anastomosis (4 cases). In three cases, the intestinal resection was enlarged, in one case being associated with partial colon resection. Two cases had only explorative laparotomy. Postoperative the patients were on complex and sustained treatment. Large antibiotic doses are recommended pre- and postoperatively. Anticoagulation is administrated as soon as the intra-operative diagnosis is established. The immediate prognosis is better for the venous infraction. Mortality was present in 7 cases (58.33%).

Key Words: ischemic intestinal syndrome.

REZUMAT:
Prin sindrom de ischemie intestinala intelegem totalitatea manifestărilor clinice produse prin reducerea totală sau partială, bruscă sau lentă a circulației intestinale. Laparoscopia diagnostica este foarte utilă la bolnavii aflați în stare critică, la care se ridică suspiciunea de infarct în stomacul de intestină și prezinta un tabel clinic neconcludent. În clinica I chirurgică a Universității „O. I. G. & Farmacie din Timișoara, în perioada 01.01.2003-01.07.2005 au fost internați 12 pacienți cu infarct intestinal. Dintr-un total de 5549 bolnavi internați 10 au fost internați, 8 au fost internați cu infarct intestinal. Dintr-un total de 5549 bolnavi internați 10 au fost internați, în aceeași perioadă, cazurile de infarct intestinal reprezintă 0,21%. Toți pacienții au fost internați, iar operațiile au durat un timp considerabil, după o minimă perioadă de explorare. În 3 din cele 9 cazuri resectia intestinala a fost extinsa, într-un caz asociați cu infarct intestinar. La 2 din cazurile studiate s-a practicat doar laparatomie exploratorie. Postoperator pacientul beneficiază de un tratament complex și susținut. Antibioticele sunt indicate în doze mari preși postoperator. Anticoagulantele se administrează începând cu precizarea diagnosticului intraoperator. Prognosticul imediat este în general mai bun în infarctul venos. În ceea ce privește mortalitatea, aceasta a fost prezenta în 7 cazuri (58.33%).

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INTRODUCTION

The acute ischemic intestinal syndrome is defined by the totality of the clinical manifestations caused by the total or partial acute reduction of intestinal circulation in an abrupt or slow manner.

The ischemic abdominal angina was described for the first time by Virchow and Chiene one hundred years ago. With the development of the arteriographic techniques, the diagnosis of arterial obstruction may be established easier. Several double blind, randomised controlled trials are performed and the number of healed patients has increased due to different surgical procedures. (5, 6)

The conservative treatment does not heal, while the mortality is over 75%.

In case of mesenteric embolia the success of the intervention is mainly dependent on the rapid diagnosis. (12)

The surgical treatment

Choosing the emergency surgical intervention, although very risky, is vital and it is the only one that may save the patient's life (14, 15). The possibilities to re-establish the intestinal circulation in acute intestinal ischemia in early stages before the appearance of irreversible intestinal lesions are the followings:

- embolectomy
- aorto-mesenteric by-pass
- thrombendarctectomy

If there are irreversible intestinal lesions in certain areas, the association of the intestinal resection with the opening of the intestinal obstruction is recommended and reduces significantly the postoperative mortality. (15)

The postoperative treatment: heparin treatment is indicated in spite of the hemorrhagic risk.

CLINICAL STUDY

Patients

Throughout the period 01.01.2003 - 01.07.2005 the Surgery Clinic I from the Medical University in Timisoara operated 12 patients with intestinal infarction out of a total of 5549 operated patients, the cases of intestinal infarction representing 0.21%. The percentage of females is significantly higher, 58.33%. It is well known that this pathology is specific for old age, but we included in our study patients aged between 45 and 82, while the mean age was 64.5 years.

Diagnosis

All the patients came to hospital and were operated on as emergency cases, after a minimum period of time that was necessary for biological investigations and preoperative preparation before such important surgical procedures. Most of these patients had also associated diseases and came to hospital when they already had complications, thus the vital risk being even higher. Diagnostic laparoscopy is very useful for critical patients under suspicion of intestinal mesenteric infarction without a relevant clinical picture. If a severe intestinal ischemia is found, with necrotic lesions, the intestinal resection is made either laparoscopic or by laparotomy.

The laparoscopic diagnosis of intestinal ischemia is useful also in the postoperative stage in order to evaluate the abdominal pain of ischemic origin. Generally, these patients are old-aged and suffer from other diseases too, which implies that the associated morbidity and mortality is high. Laparoscopy may avoid a laparotomy, which increases the morbidity and mortality rates (15). There is also a high incidence of false negative diagnosis by laparoscopy. If the laparoscopic diagnosis does not confirm the clinical one, the patient must be kept under observation and if necessary, the exploration should be re-done.

The fluorescein examination may be used in the laparoscopic diagnosis. 2-3 minutes after the i.v. injection of 1 gram of fluorescein, the normal intestines become yellow-greenish while there is no colour change in the ischemic intestine.

The laparoscopic Doppler ultrasound could offer data regarding the mesenteric vascularization.

The analyzed patients, according to the type of intestinal infarction could be grouped as follows (table 1):

- 7 patients presented intestinal infarction of arterial type (58.33%), out of these 4 were males (33.33%) and 3 females (25%)
- 3 patients had venous infarction, 1 male (8.33%) and 2 females (16.66)

<table>
<thead>
<tr>
<th>NUMBER OF CASES</th>
<th>FEMALE</th>
<th>MALE</th>
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<tbody>
<tr>
<td>12</td>
<td>7 (58.33%)</td>
<td>5 (41.7%)</td>
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</table>

Case distribution on sexes
A female patient had mixed intestinal infarction (8.33%).

Regarding the associated diseases in our group, the following could be enumerated:

- Diabetes
- Chronic peripheral arteriopathy
- Congestive cardiac insufficiency
- Biliary lithiasis
- Hypertension
- Acute myocardial infarction
- Chronic ischemic cardiopathy with rhythm disturbances
- Rheumatoid polyarthritis
- Colo-aortic fistula
- Postoperative incision hernia
- One special case with post-esophagoplasty with transverse colon for post-caustic stenosis

**Treatment**

In order to extract the embolus, a longitudinal mesenteric arteriotomy is usually performed and rarely a transversal one. The peripheral end is disobliterated first, where the embolus is prolonged with a secondary thrombus and then the proximal end. Sometimes, it is necessary to continue the embolectomy with a segmental endarterectomy. If the suture of the arteriotomy could lead to a stenosis, it is necessary to put a patch using the saphena vein. In spite of the sustained anticoagulation treatment after the embolectomy, the postoperative thrombosis appears in a rather high percentage of cases.

The aorto-mesenteric by-pass presents the great advantage that it does not require the dissection of the origin of the mesenteric artery. It may be performed using synthetic materials, venous transplantation or the splenic artery after splenectomy (Lucke). The major inconvenience is the change of the sanguine flow, which favours the occurrence of thrombosis (17). The thrombendarterectomy is practised since 1956 but the success rates are quite low.

The re-implantation of the superior mesenteric artery proposed by Mikkelsen in 1957 implies a termino-terminal anastomosis with the aorta in a place distally situated from the common origin site of the

<table>
<thead>
<tr>
<th>INTESTINAL INFARCTION</th>
<th>CASES</th>
<th>MALE</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial</td>
<td>7(58,33%)</td>
<td>4 (33,33%)</td>
<td>3 (25%)</td>
</tr>
<tr>
<td>Venous</td>
<td>3 (25%)</td>
<td>1 (8,33%)</td>
<td>2 (16,66%)</td>
</tr>
<tr>
<td>Mixed</td>
<td>1(8,33%)</td>
<td>-</td>
<td>1 (8,33%)</td>
</tr>
<tr>
<td>Without vascular lesions</td>
<td>1 (8,33%)</td>
<td>-</td>
<td>1 (8,33%)</td>
</tr>
</tbody>
</table>

Table 1.

- 1 female patient had mixed intestinal infarction (8.33%)
- 1 female patient had intestinal infarction without vascular lesions (8.33%).

<table>
<thead>
<tr>
<th>Surgical procedure</th>
<th>Cases</th>
<th>Additional interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segmental enterectomy</td>
<td>8 cases</td>
<td></td>
</tr>
<tr>
<td>Jejunoileal + colon resection</td>
<td>1 case</td>
<td>Partial colon resection (1 case)</td>
</tr>
<tr>
<td>Explorative laparotomy</td>
<td>3 cases</td>
<td>Eventration treatment (1 case)</td>
</tr>
</tbody>
</table>

Table 3
mesenteric artery. It is essential that the wall of the two vessels does not present advanced atherosclerotic lesions.

In contrast to the arterial thrombosis, the venous thrombosis occurs more frequently on the small vessels rather than on the principal vein. Accordingly, only a short segment of the intestine is affected and the intestinal resection is easier to perform.

The treatment of the infarction of venous origin: the only treatment that may save the patient’s life is the intestinal resection and this can be performed as the infarction is localized only in one intestinal segment. (1, 2, 10)

In the majority of cases an intestinal resection was performed (9 cases) with termino-terminal anastomosis (5 cases) and a latero-lateral one (4 cases). In 3 out of 9 cases the intestinal resection was extensive, one case including also a partial colon resection (table 3).

Two of the patients from the studied group had only an explorative laparotomy.

One of them, a 47-years old male, who has had several post-caustic interventions for re-establishing the stenotic intestinal transit, had an esophagoplasty with transversal colon placed retrosternally. He was admitted to hospital as emergency with superior digestive hemorrhage, colo-aortic fistula, severe hemorrhagic shock and extensive intestinal infarction. He died during the operation.

The other 66-year-old, was transferred from the hospital in Lugoj in a severe state, with multiple organ insufficiency, extensive intestinal infarction probably of embolic origin. The patient had permanent heart rhythm disturbances and rapid atrial fibrillation. When the peritoneal cavity was opened, the peritoneal liquid had a fetid smell with modified coloration; the intestinal ansa and the ascendant colon were paretic with a macroscopic aspect of parietal ischemia of different degrees. The superior mesenteric pedicle was put into evidence and its artery was thrombotic and atheromatous (figure 1, 2).
After re-balancing the arterial flow at the level of the ischemic intestine, two possible complications are remarked:

1. Severe metabolic deficiency characterized by hyponatremia, hypopotasemia, acidosis and fall of blood pressure.
2. An enterorrhagia followed by diarrhea and by a bad absorption syndrome until the destroyed intestinal mucosa heals. After the arterial or venous permeability is re-gained, the compromised intestinal parts have to be resected. In some cases when the vitality of the intestine is questionable, a new deliberate intervention was proposed after 12-24 hours from the first operation. During this time the patient is under sustained medical treatment. Antibiotics are prescribed pre- and postoperatively. Anticoagulation treatment is installed starting with the intra-operative determined diagnosis. Some authors reported no mortality in the primary venous thrombosis treated with anticoagulants compared to mortality over 50% in the cases with no anticoagulation treatment. The anticoagulation treatment could be curative during the first hours from the venous infarction onset.

**Prognosis**

The immediate prognosis of the venous infarction is better than one of the arterial infarction and this is due to the limited lesions that make possible a limited intestinal resection. Rapid diagnosing and the immediate start of surgical emergency treatment are of vital importance, before an extensive thrombosis is installed.

The medium and long-term prognosis is, on the other hand, more cautious with a mortality rate approaching 100% if we take into consideration that this type of infarction occurs when the patient is in a terminal stage in another severe disease.

Mortality was 58.33% (7 cases) in our group and the causes of death were the followings:

- decompensated toxic-septic shock       1 case
- irreversible cardiac insufficiency    3 cases
- renal insufficiency                   1 case
- severe hemorrhagic shock              1 case
- acute myocardic infarction            1 case

One patient was discharged on the family’s request, and the case aggravated in the first 48 hours after the operation.

The statistical study that was made over this period of time includes only 12 cases, seemingly modest compared to the large studies published in Romania and abroad, as the one of Ottinger made on 132 cases and that of Lepadat on 126 cases, but these represent the cases treated in several surgical clinics, for a longer period of time.

The present study is made on the cases from a single surgical clinic and in a rather short period of time, but on relatively constant therapeutic approaches and enables us to draw some useful and interesting conclusions:

**CONCLUSIONS**

1. It is well-known that this pathology is common for old-aged people. In this study we included only one 45-year-old patient suffering from this disease, while the mean age was of 64.5 years.
2. The mean annual frequency of acute ischemic intestinal syndrome was of 0.13-0.27%, a relatively low frequency compared to the rest of the pathologies that were hospitalized and operated in the clinic over the same period of time.
3. In case of mesenteric embolism, the success of the operative intervention largely depends on the rapidity of the diagnosis.
4. The diagnostic laparoscopy was very useful for the critical patients, for whom there was a suspicion of mesenteric intestinal infarction but who presented an irrelevant clinical picture.
5. The laparoscopic diagnosis is useful in the absence of a reliable diagnosis, avoiding this way an unnecessary laparotomy and having a low complication rate.

<table>
<thead>
<tr>
<th>Hospitalization time</th>
<th>1-19 days</th>
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<tbody>
<tr>
<td>Mean</td>
<td>7.5 days</td>
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<table>
<thead>
<tr>
<th>No. of cases</th>
<th>Healed</th>
<th>Ameliorated</th>
<th>Aggravated</th>
<th>Deceased</th>
</tr>
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<tbody>
<tr>
<td>12</td>
<td>3 (24.9%)</td>
<td>1 (8.3%)</td>
<td>1 (8.3%)</td>
<td>7 (58.33%)</td>
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</table>
6. There are several possibilities to re-establish and re-balance the intestinal circulation in the acute intestinal ischemia, before the installation of irreversible intestinal lesions: embolectomy, aorto-mesenteric by-pass, thrombendarterectomy.

7. If there are irreversible intestinal lesions in certain areas, it is recommended to associate the intestinal resection with arterial desobstruction, lowering considerably the post-operative mortality.

8. After the intestinal flow is re-established at the level of the ischemic intestine, two possible complications may occur:
   a. severe metabolic deficiency characterized by hyponatremia, hypopotasemia, acidosis and fall of blood pressure.
   b. an enterorrhagia followed by diarrhea and by a bad absorption syndrome until the destroyed intestinal mucosa heals.

9. Acute ischemic intestinal syndrome is a surgical emergency with a severe prognosis in spite of the major advances that have been made in modern medicine. The postoperative mortality remains rather high (66.6 %), in our study we had 7 deaths (58.33 %) plus 1 aggravation (8.3 %).

10. The developing of new surgical, laparoscopic instruments and an increased laparoscopic training and experience, as well as their use on a large scale will probably lead to important progress in this area, making the surgical intervention easier, shortening the hospitalization time and leading to a quicker recovery.

References.