Evaluation of serum levels of interleukin-6 and interleukin-10 in patients undergoing laparoscopic versus conventional cholecystectomy

Avaliação dos níveis séricos de interleucina-6 e interleucina-10 nos pacientes submetidos à colecistectomia laparoscópica versus *convencional*

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A B S T R A C T

Objective: To correlate serum preoperative and postoperative interleukin-6 and interleukin-10 levels in patients undergoing laparotomy versus laparoscopic cholecystectomy. **Methods**: From a total of 20 patients, 18 were included in the study, nine underwent cholecystectomy by laparoscopy and the other nine by laparotomy. Serum concentrations of IL-6 and IL-10 were measured in both groups. Blood samples were obtained in the times of 24 hours preoperatively and four, 12 and 24 hours after the procedure. The groups were compared regarding age, gender, body mass index (BMI), duration of anesthesia and operation. **Results**: There was no significant statistical differences between groups related to age, gender, BMI, duration of anesthesia and operation. The comparison between the two procedurs demonstrated statistical differences for IL-6 in time 12 hours after operation (218.64 pg/ml laparotomic versus 67.71 pg/ml laparoscopic, p = 0.0003) and for IL-10 in time 24 hours after the procedure (24.46 pg/ml open versus 10.17 pg/qml laparoscopic, p <0.001). **Conclusion**: There was an Increase in plasma levels of interleukin-6 and 10 after surgical trauma with a significant increase in levels of interleukins in the laparotomic group in comparison with the laparoscopic group.

Key words: Biological markers. Laparoscopy. Cholecystectomy. Interleukin-6. Interleukin-10.

INTRODUCTION

The advent of laparoscopic surgery represents a radical change in the paradigms of current clinical practice. It Brought great benefits to patients, such as faster recovery, shorter hospital stay and quick return to daily activities. Also associated with lowest tissue trauma and better results, laparoscopy had significant increase in demand for its use in new procedures [1].

As laparoscopic surgery is "minimally invasive" and the immune response to trauma is proportional to the extent of it, by intuition, laparoscopic surgery may have immune responses different from open surgery [2]. This response may be reflected by cytokines and the cellular messenger system. Serum cytokine levels do not directly reflect the immune status, but demonstrate the underlying immune system activation, providing a means to understand how laparoscopic surgery affects the metabolic and immune system [2]. Thus, the most important mediators of acute phase inflammatory response, interleukin-1 (IL-1), tumor necrosis factor (TNF), interleukin-6 (IL-6) and C reactive protein (PCR), can be good examples of this type of response [3].

For laparoscopic surgery is necessary to inject gas into the abdominal cavity, creating a pneumoperitoneum, carbon dioxide (CO2) being the most used gas. The presence of CO2 in the abdominal cavity seems to attenuate this acute phase inflammatory response, possibly causing local cellular acidosis and blocking the secretion of cytokines, changing the cytokine receptors in the liver and in other tissues or acting in hepatocytes, changing the hepatic answer to inflammatory stimuli. So CO2 pneumoperitoneum may bring consequences to the immune response [4].

Inflammation in surgical trauma is induced by proinflammatory mediators, such as interleukin-6, C-reactive protein, among others, and anti-inflammatory mediators such as interleukin-10 (IL-10) and prostaglandin E2, considered immunosuppressors, which demonstrates immunoregulation [5].

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IL-6 and IL-10 are mediators present in inflammatory response after surgical trauma. It is also known that both display an autoregulation effect, an increased in IL-6 reflecting in a concomitant increase of IL-10 [5].

In this sense, given the importance of laparoscopy in surgical clinics today, one may wonder if there are differences between the inflammatory response of this procedure and the one of open surgery [2].

Cholelithiasis is a disease of high prevalence in general population and its treatment of choice is cholecystectomy, open or laparoscopic. This condition provides the possibility of forming homogenous groups with smaller variants when compared to other diseases like, for example, neoplasms or trauma, in the study of inflammatory response [1].

Thus, this study aims to correlate the serum preoperative and postoperative levels of interleukin-6 and interleukin-10 in patients undergoing open versus laparoscopic cholecystectomy.

METHODS

This work is characterized as a prospective, longitudinal, controlled study, in which serum levels of interleukin-6 and interleukin-10 were collected from patients undergoing open and laparoscopic cholecystectomy and a comparison between these two procedures was performed.

Twenty patients were divided into two groups of 10 each and denominated as follows: Group L, undergoing laparoscopic cholecystectomy; and Group A, open cholecystectomy. Dosages of serum interleukin-6 and interleukin-10 were accomplished in four steps with regard to procedure: 24 hours before and four, 12 and 24 hours after surgery. The research project was approved by the Ethics Committee on Human Research at the Catholic University of Paraná and the CONEP under the number 00240084000-07. To compose the two experimental groups, we selected 20 patients who spontaneously sought the General Surgery clinic of the Hospital of Charity of the Brotherhood of Santa Casa de Curitiba, all because of cholelithiasis with indication for cholecystectomy.

The hospital has two queues for surgical treatment of cholecystitis. In one, patients voluntarily opting for open cholecystectomy, and the other by laparoscopic cholecystectomy. After the initial evaluation of the medical records of these patients, we performed the selection.

Exclusion criteria were: 1) presence of acute cholecystitis at the time of surgery, assessed by the presence of perivesicular fluid or pus, signs of vesicular wall hyperemia or pus inside the vesicle; 2) choledocholithiasis; 3) need for conversion to open procedure; 4) patients ASA III or ASA IV; 5) change in the standard anesthesia,;6) signs and / or symptoms of any acute illness in the preoperative or immediate postoperative period; 7) trauma within the last 30 days; 8) surgical treatment of any kind with less than 30 days; 9) use of immunosuppressive drugs; 10) diseases with immunological characteristics; 11) chronic inflammatory diseases of any kind; 12) failure of the first attempt of venipuncture to administer medications in the operating room; 13) need for a new placement of peripheral venous access; 14) failed of the first attempt of venipuncture for collection of blood samples; 15) need for extending the supra-umbilical incision, in the skin and / or abdominal wall, in more than one centimeter to remove the gallbladder in laparoscopic surgery; 16) patient's denial, at any time, of collection of blood samples; 17) allergy to any drug used in the protocol; 18) any kind of allergic symptoms postoperatively; 19) histopathology of the gallbladder showing signs of acute cholecystitis or cancer. All patients underwent procedures on the same day of hospitalization. They fasted for 12 hours before the operation, with release of liquid / normal diet 24 hours after. Anti-inflammatory analgesics were not prescribed during hospitalization, neither after discharge.

Discharge was planned on the first day after surgery for all patients. To collect blood from 24 hours before the procedure, each patient was instructed to, attend to the lab at 9 AM after fasting for 12 hours. Postoperatively, three samples were collected in four, 12 and 24 hours after the operation and performed in the hospital. They were obtained from peripheral venous blood, 5ml being withdrawn each time.

To quantify the cytokines interleukin-6 and interleukin-10 in the different serum samples in the times proposed, the technique used was that of enzyme immunoassay quantitative "sandwich" type (ELISA) using a monoclonal antibody specific for the cytokine to be dosed, enzyme reagent and substrate. We used the kit eBioscience's ™ ELISA Ready-SET-Go! for both for interleukin-6 and interleukin-10, with a sensitivity to 2pg/ml and variation of standard curve between 2 and 200 pg/ml for interleukin-6 and sensitivity of 2 pg/ml and variation of standard curve between 2 and 300 pg/ml for interleukin-10.

All samples were dosed in duplicate and the unity used was picogram per milliliter (pg/ml). Dosages of both interleukins were carried out at the Institute of Biomedical Research of the Hospital São Lucas, Catholic University of Rio Grande do Sul (PUC-RS). The transport of the material was by plane, with storage of samples in a box with insulation and dry ice, coupled with a digital thermometer, at -80 ° C.

We considered an increased immunological response when there was serum elevation of IL-6. In contrast, the increased serum levels of IL-10 was considered an effect inducer of immunosuppression to the procedures studied.

Statistical analysis used Mann-Whitney U test for nonparametric data and the Fisher's exact test for

comparison of ordinal variables between independent groups and A and L (nominal variables). For comparison of ordinal dependent variables within each group, we used the Wilcoxon test. Results were considered statistically significant with p <0.005).

RESULTS

Twenty cholecystectomies were performed, 10 patients underwent laparoscopic cholecystectomy, forming the L group and 10 patients underwent open cholecystectomy, forming the group A.

Patients were referred from A1 to A10 in group A and L1 to L10 in group L. We excluded two patients, one from each group, due to acute cholecystitis observed during surgery and later confirmed by histopathological analysis, thus nine remained on each group. All patients were classified as ASA I, according to the Classification of American Society of Anesthesiology, recovered uneventfully and were discharged on the first day after surgery. The histopathologic study of the 18 patients included did not show the presence of cancer or signs of acute cholecystitis.

Group A was formed by a man and eight women, mean age of 40.41 ± 6.97 years and mean BMI of 26.77 ± 4.87 kg/m^2, with a mean time of surgery of 47.11 ± 14.29 minutes and anesthetic length 71 ± 16.79 minutes (Table 1).

The L group was composed of two men and seven women, mean age 44.88 ± 12.61 years and BMI 25.94 ± 4.39 kg/m^2. The mean operation time was 45.44 ± 23.52 minutes and anesthetic time of 80.44 ± 22.69 (Table 1).

Between the two groups, there were no statistical differences in relation to gender (p = 0.5). No statistical differences were demonstrated in relation to mean age in group A versus group L (p = 0.89) and between the average body mass index (p = 0.75).

Mean time of operation (p = 0.45) and anesthesia (p = 0.35) were not statistically different between groups A and L either.

For group A, the serum level of interleukin-6 at 24 hours of preoperatively presented an average of 10.67 ± 7.32 pg/ml; four hours after the operation the average reached 106.08 ± 47.74 pg/ml; 12 hours, 218.64 ± 31.57 pg/ml; and 24 hours later, 244.64 ± 64.23 pg/ml (Table 2). There was statistical difference between preoperative serum levels and all other times (p <0.05), as well as between the times of four and 12 hours (p <0.05) and four and 24 hours (p <0.05). However, there were no significant differences between the times of 12 and 24 hours after the procedure (p = 0.88).

The mean serum levels of interleukin-10 from group A 24 hours before the operation was 3.54 ± 4.42 pg/ml; four hours after, 9.68 ± 0.73 pg/ml; 12 hours, 11,15 ± 3 , 51 pg/ml; and 24 hours after the procedure, 24.46 ± 1.59 pg/ml (Table 3). There were statistical differences between the levels of IL-10 before the operation and all other times (p <0.05), between four and 24 hours (p = 0.007) and between 12 and 24 hours postoperatively (p = 0.007).

The mean serum levels of interleukin-6 for the group L 24 hours preoperatively were 6.23 ± 3.23 pg/ml; four hours after, 89.22 ± 70.64 pg/ml; 12 hours, 67.71 ± 31.92 pg/ml; and 24 hours, 165.36 ± 124.1 pg/ml (Table 2).

There were statistical differences comparing the preoperative levels of IL-6 versus all other times of postoperative IL-6 (p <0.05), as well as between times 24 preoperatively and 24 hours postoperativel (p = 0.007).

As for interleukin-10 in group L, 24 hours before the procedure the serum level was 4.17 ± 4.07 pg/ml; four hours after, 10.15 ± 8.53 pg/ml; 12 hours after, 8.24 ± 3.52 pg/ml; and 24 hours after the surgical procedure, 10.17 ± 3.03 pg/ml (Table 3). There were statistical differences between the mean levels of IL-10 at 24 hours preoperatively and all other times (p <0.05), as well as between levels at 12 and 24 hours after the procedure (p = 0.01).

When comparing the mean IL-6 at the four times between the groups L and A, there was a statistical difference between the mean serum levels of IL-6 in time 12 hours among patients of groups A and L (218.64 ± 31,

Table 1 - Characteristics of the individuals studied.

Patients[a]	Gender[b]	Age[c]	BMI[d]	TA[e]	ST[f]
L1	M	49	30.7	82	41
L2	M	62	24.6	81	45
L3	F	46	25.4	85	55
L4	F	36	18.7	60	36
L5	F	26	22.2	70	33
L6	F	31	28	57	26
L7	F	47	22.4	100	44
L8	F	63	31	61	26
L9	F	44	30.5	128	103
A1	M	47	33.9	57	45
A2	F	44	16.9	85	53
A3	F	46	24.8	82	54
A4	F	35	28.1	93	55
A5	F	56	30.4	56	35
A6	F	55	23.3	52	25
A7	F	47	27.4	65	50
A8	F	37	26.2	92	73
A9	F	45	30	57	34

[a] Percents operated: L – laparoscopic / A – open;
[b] M – male / F – female;
[c] age in years;
[d] BMI - Body mass index (kg/m^2);
[e] TA – time of anesthesia in minutes;
[f] ST – surgical time in minutes.

Table 2 - Serum levels of Interleukin-6 in groups A and L.

Patients [a]	IL-6 preop. [b]	IL-6 / 4 h [c]	IL-6 / 12 h [d]	IL-6 / 24 h [e]
L1	4.8	56.5	54.3	58.7
L2	5	189.2	119.6	237.8
L3	10.9	56.5	54.6	62.2
L4	5.9	118	67.8	73.7
L5	9.4	24.6	40	343.2
L6	0	25	67.4	73.9
L7	9.1	39.1	30.8	340.5
L8	5.5	56.5	120.6	239.6
L9	5.5	167.6	54.3	58.7
A1	9.1	168.5	259.2	196.3
A2	25	80.4	189.2	208.1
A3	4.9	67.4	205.4	329.7
A4	8.5	79.4	189.2	207.6
A5	5.9	170.3	260.9	197.3
A6	11.8	169.4	258.7	195.2
A7	5.5	70.2	208.6	330.7
A8	4.8	80.4	191.2	207.2
A9	20.6	68.6	205.4	329.7

[a] Patients operated: L – laparoscopic / A – open;
[b] IL-10 preop.: serum IL-6 serum (pg/ml) 24 hours before the procedure;
[c] IL-10 / 4 h: serum IL-6 (pg/ml) 4 hours after the procedure;
[d] IL-10 / 12 h: serum IL-6 (pg/ml) 12 hours after the procedure;
[e] IL-10 / 24 h: serum IL- 6 (pg/ml) 24 hours after the procedure.

57 pg/ml group A and 67.71 ± 31.92 pg/ml in group L, with p = 0.0003) (Table 4). For other times, there were no statistically significant differences (Figure 1).

Regarding IL-10, there was a statistical significance between the average levels of groups A and L at 24 hours after the procedure (24.46 ± 1.59 pg/ml in

Table 3 - Serum levels of Interleukin-10 in groups A and L.

Patients[a]	IL-10 preop[b]	IL-10 / 4 h[c]	IL-10 / 12 h[d]	IL-10 / 24 h[e]
L1	2	11.2	10	11.5
L2	0	10.8	9.2	11.7
L3	8.7	11.2	10.6	11.5
L4	2.2	10.8	10	10.5
L5	0	2.2	10.2	10.5
L6	0	20	2	10.5
L7	9.4	2.2	2.2	2.2
L8	7.3	11.2	9.2	11.7
L9	8	29.8	10.8	11.5
A1	2.2	9.2	9.2	22.2
A2	0	10.8	20.2	25
A3	2	9.2	11.5	26.2
A4	0	10.6	10.6	25
A5	0	9.2	9	22.6
A6	11	9.2	8.6	22.6
A7	0	9.2	10	25.2
A8	8	10.6	10.8	25
A9	8.7	9.2	10.5	26.4

[a] Patients operated: L – laparoscopic / A – open;
[b] IL-10 preop.: serum IL-10 serum (pg/ml) 24 hours before the procedure;
[c] IL-10 / 4 h: serum IL-10 (pg/ml) 4 hours after the procedure;
[d] IL-10 / 12 h: serum IL-10 (pg/ml) 12 hours after the procedure;
[e] IL-10 / 24 h: serum IL- 10 (pg/ml) 24 hours after the procedure.

group A and 10.17 ± 3.03 pg/ml in group L, p <0.001) (Table 5). In the time remaining, the differences were not significant.

DISCUSSION

Gallstones is the most common surgical treatment disease of the digestive tract. Approximately 10% of the world's population and 20% over 40 years in the United States are affected by the disease [6,7]. The treatment of choice for gallstones is surgical resection of the gallbladder, preventing its complications such as cholecystitis, gallbladder perforation, acute pancreatitis and peritonitis. Cholecystectomy has low surgical stress, short hospitalization and rapid recovery. Thus, it presents itself as a model for study of inflammatory reactions and is considered the most studied laparoscopic surgical procedure[8,9].

Techniques of minimally invasive surgical procedures result in reduction in operative wound size, less abdominal wall lesion, muscles and aponeuroses and therefore less tissue damage. In laparoscopic surgery there is less handling and traction of abdominal organs by retractors, there is no use of tampons on viscera or need for retraction of the abdominal wall. These factors may be related to the reduction in magnitude and duration of serum levels of cytokines found after laparoscopic procedures, in particular cholecystectomy [10].

The inflammatory response is associated with pro-inflammatory cytokine release and acute phase proteins. TNF-alpha, IL-1 and IL-6 are the largest mediators of acute phase response in humans [11]. The first two are responsible for the activity of extrahepatic manifestations such as fever, elevation of prostaglandins, tachycardia, and accelerated catabolism. IL-6 is primarily responsible for the hepatic response, resulting in the synthesis of acute phase proteins and C-reactive protein, and activation of immunosuppressive cytokines, of regulatory function, such as IL-10. Serum cytokine levels and C-reactive protein are related to the magnitude of operative trauma and presence of complications. Therefore, they can be used as objective biochemical markers that reflect the surgical and tissue trauma, such as IL-6, which has a serum peak between four and 48 hours after trauma, activating IL-10 and C-reactive protein, which have their serum levels increased untill up to 30 days post trauma [12-16].

Factors related to each patient can modify the inflammatory response for the same type of trauma [17]. Diseases of immunological characteristics, such as rheumatoid arthritis, systemic lupus erythematosus, Crohn's disease, diabetes mellitus and bronchial asthma may alter serum levels of IL-6[18]. The use of medicinal products with immunosuppressive or anti-inflammatory characteristics, such as corticosteroids, usually used in treating chronic inflammatory or immunological diseases, modify cellular and humoral immunological

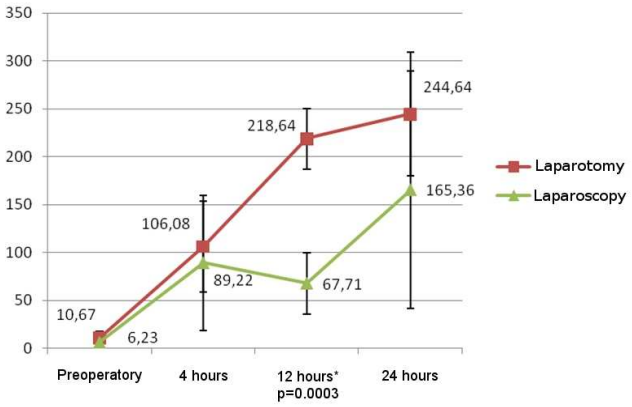

Figure 1 - *Variation of levels of IL-6 between groups L and A.*

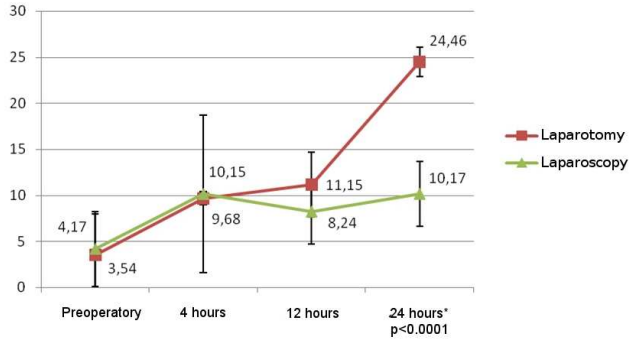

Figure 2 - *Variation of levels of IL-10 between groups L and A.*

response, which impairs the analysis of serum inflammatory markers in these patients [17]. Malignancy can produce inflammatory cytokines, such as IL-6 and TNF-alpha, which may act as tumor growth factors, affecting the immune status of the patient, with a greater degree of immunosuppression in patients undergoing laparotomy for cancer when compared to those undergoing laparotomy for benign disease [18,19].

The ASA classification allows stratifying surgical risk by analyzing the basic diseases and their control. ASA III and IV patients have uncontrolled chronic diseases that can modify the inflammatory response to trauma[18]. Allergic conditions are synonymous to exacerbated acute phase inflammatory reactions, characterized by elevation of acute phase proteins, increased vascular permeability and increased cytokines, which alter the assessment of inflammatory markers [18].

The presence of acute illness has the same effect of surgical trauma in the activation of the immune system, but in an uncontrolled way [20,21]. IL-6 activates the C-reactive protein, which displays elevated serum levels for up to 30 days post-trauma. Thus, trauma of any kind modifies the systemic immune response in a shorter time of evolution, such as acute cholecystitis, s any disease of acute onset or uncontrolled trauma, a great number of venipunctures and need for choledocotomy when dealing with choledocholithiasis [20,21] .

To obtain reliable results of serum IL-6 and IL-10, two groups were set, group A and group L, with similar characteristics with respect to ASA classification, age, BMI, gender, operation time and anesthesia.

BMI is a way to measure the degree of obesity of each patient. Obesity is characterized by the activation of inflammatory processes in metabolically active sites such as liver, adipose tissue and immune cells [22]. The consequence of this response is an increase in circulating levels of pro-inflammatory cytokines, adipokines and other inflammatory markers.

Age modifies plasma levels of IL-6. With its advance there is an increase in serum cytokine levels due, in part, to related diseases and decrease of sex hormones [18].Female have a greater immune response, both cellular and humoral, greater resistance to infection and are more prone to autoimmune diseases, probably by the action of female sex hormones [17].

According to the results, both groups are homogeneous when analyzed by age, BMI, operation time, anesthesia and gender [17,18,22,23]. Despite the numerical differences between the proportion of males and females for both groups, there were no statistically significant differences.

Regardless of laparoscopic or open cholecystectomy, there was an increase in serum levels of IL-6 and IL-10, proving that for any type of trauma there is systemic inflammatory response [19].

We observed significantly higher levels of IL-6 in group A when compared to group L, denoting the increased inflammatory response that the open procedures have in relation to videosurgery [24-28].

A non-randomized prospective study comparing patients undergoing open and laparoscopic cholecystectomy showed lower serum levels of IL-1 and IL-6 in an hour after the laparoscopic procedure, with a peak at six hours for both interleukins ($p < 0.005$). Serum levels of C-reactive protein only became significantly lower for patients in the video group after 72 hours, thus mirroring the less inflammatory response of videosurgery when compared to the open surgical technique [29].

A prospective study ($n = 40$) comparing patients using open versus laparoscopic cholecystectomy found no statistical differences in levels of IL-1 beta and TNF-alpha (or TNF-á) [13]. However, there were significant differences in IL- 6, lower for the group video ($p < 0.0001$), as well as for C-reactive protein ($p < 0.001$), both in time 12 hours after the operation. Likewise, our results showed statistically significant differences in levels of interleukin-6 after 12 hours of the procedure. However, the highest average values between the levels of IL-6, both for group A and for group L, were observed 24 hours after the operation, although without significant differences between the groups of patients in that time. Literature data corroborate this finding, as that peak interleukin-6 levels have been observed to occur between four and 48 hours[12,14]. Serum levels of IL-6 were significantly lower in the group of patients undergoing laparoscopic cholecystectomy in the times six, 24 and 48 hours after the operation ($p < 0.005$)[14], unlike the results of this study, in that the statistical significance occurred only in time 12 hours. Nevertheless, the mean values of serum IL-6 in group L remained below the values of group A at all other postoperative times, without significant differences. This fact can be explained by our sample being smaller than the ones from other studies [26,27].

The levels of IL-6 were lower in time 12 hours post-trauma in relation to time four hours in the laparoscopic group. This event may have occurred due to the smaller sample and the many factors that can influence the release of serum IL-6[18]. But there was no statistical difference between the levels of IL-6 at times four and 12 hours after trauma. A similar event occurred with IL-10 on the laparoscopic group at the same times. This can be explained by the proportionate increase in interleukin-6 and 10, since both have a counterregulatory effect [30].

In a study on the cytokine response in patients undergoing Nissen fundoplication [31], it was observed an increased in IL-6 and IL-10 both in laparoscopic and in open procedures, but with significantly higher levels in the open group. In our analysis there was also a significant increase in levels of IL-6 and IL-10, both for the open group and for the video one, which was similar to data from literature that demonstrates the increase of serum IL-10 dependent of interleukin-6 release[32]. Similar results were identified in urologic operations, both for IL-6 as for IL-10 [33], and in another comparative study between open and laparoscopic colectomies showed increased in IL-6 and IL-10 for both procedures, with significantly higher levels for both interleukins in the open group, demonstrating a concomitant increase. The results of this study reveal significantly elevated serum levels of interleukin-10 on the group of patients undergoing open cholecystectomy in relation to the laparoscopy group 24 hours after the procedure.

In this work we could observe that the increase of IL-6 serum was followed by a concomitant increase of IL-10 at the same times, independent of the surgical trauma being open or laparoscopic, denoting the existence of a counterregulatory effect of IL-10 on the increase of IL-6, as demonstrated on data from current literature [30].

Regardless of the trauma being open or laparoscopic, there are increased serum levels of interleukins, which are significantly higher in patients undergoing open procedures, demonstrating that laparoscopic cholecystectomy displays less inflammatory response when compared to the open technique.

RESUMO

Objetivo: *Correlacionar a dosagem sérica pré-operatória e pós-operatória de interleucina-6 (IL-6) e interleucina-10 (IL-10) entre pacientes submetidos à colecistectomia laparotômica* versus *videolaparoscópica.* ***Métodos:*** *De um total de 20 pacientes, 18 foram incluídos no estudo, sendo nove submetidos à colecistectomia laparoscópica e os outros nove utilizando a técnica laparotômica. As concentrações séricas de IL-6 e IL-10 foram dosadas em ambos os grupos. As amostras de sangue foram obtidas nos tempos de 24 horas no pré-operatório, quatro, 12 e 24 horas após o procedimento. Os grupos foram comparados em relação à idade, sexo, índice de massa corpórea (IMC), tempo de anestesia e de operação.* ***Resultados:*** *Não houve diferenças significativamente estatísticas entre os grupos relacionadas à idade, sexo, IMC, tempo de anestesia e de operação. A comparação entre a colecistectomia laparotômica e laparoscópica demonstrou diferenças estatísticas nos níveis de IL-6 no tempo 12 horas após operação (218,64pg/ml laparotômica* versus *67,71pg/ml laparoscópica, p=0,0003) e IL-10 no tempo de 24 horas após o procedimento (24,46pg/ml aberta* versus *10,17pg/ml laparoscópica, p <0,001).* ***Conclusão:*** *Houve aumento das dosagens de interleucinas-6 e 10 após o trauma cirúrgico. Ocorreu aumento significativo dos níveis das interleucinas analisadas no grupo laparotômico em comparação com o grupo laparoscópico.*

Descritores: *Marcadores biológicos. Laparoscopia. Colecistectomia. Interleucina-6. Interleucina-10.*

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