Is there a change in serum CA-125 levels after laparoscopy?

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Summary

There is no adequate data in the medical literature defining serum CA-125 levels after laparoscopy. Therefore we designed this prospective study to evaluate the effects of laparoscopy on serum CA-125 levels. Eighty-two women (mean age 34.2 ± 12.30 years) were included in the study between January, 2001 and April, 2003. Laparoscopies were performed in patients with chronic pelvic pain, dysmenorrhea, infertility, ovarian cysts and for tubal ligation. Mean serum CA-125 levels of the patients before and after the laparoscopic procedures were 13.96 ± 4.86 U/ml and 14.02 ± 4.96 U/ml, respectively. The change in serum CA-125 levels prior to laparoscopy was statistically insignificant when compared with the levels obtained at 24 hours after laparoscopic procedure ($p > 0.05$). We found that diagnostic laparoscopy or laparoscopic surgical procedures did not change the levels of CA-125 at the 24th hour after laparoscopy indicating either serum CA-125 levels are not correlated, at least within 24 hours, with peritoneal irritation or peritoneal irritation is minimal or absent in our operations.

Key words: Laparoscopy, CA-125.

Introduction

Cancer antigen-125 (CA-125) is expressed in amnion and its derivatives of fetal coelomic epithelia such as Müllerian epithelia, peritoneum, pleura, and pericardium and in many adult tissues such as the epithelium of the fallopian tubes, endometrium, endocervix, pleura and peritoneum [1]. Increased levels of CA-125 may accompany many clinical conditions such as ovarian carcinoma, pregnancy, endometriosis, pelvic inflammatory disease, non-malignant ovarian cysts and ovarian hyperstimulation [2-5]. Although the structure of CA-125 is well defined [6], its physiological role is still unclear. CA-125 has been suggested to play a role as a lubricant preventing adhesion of membranes [7]. In case of trauma, disruption of tissues such as the peritoneum, pleura, fallopian tubes or endometrium, results in increased CA-125 levels in circulation [7].

Laparoscopy is one of the most common surgical operations all over the world and easily performed by trained and equipped surgeons with a complication rate as low as 27% [8]. Although laparoscopy is often performed with a low complication rate, we can not neglect postoperative adhesion formation, which may cause fertility problems in patients. Despite more than 4-times less adhesion formation after laparoscopy when compared to laparotomy, the risk of de novo adhesion formation following operative laparoscopy is 12% [9].

Also, CA-125 measurements are very crucial in the follow-up of patients treated for ovarian carcinoma and any reason interfering with CA-125 levels must be cautiously managed.

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Patients and Methods

Study participants

In this study a cut-off value for CA-125 was accepted as 35 U/ml and patients that would undergo laparoscopy with serum CA-125 levels below cut-off values were included in the study. Eighty-two women (mean age 34.2 ± 12.30 years) were enrolled between January 2001 and April 2003. Laparoscopies were performed in patients with chronic pelvic pain, dysmenorrhea, infertility, ovarian cysts and for tubal ligation (Table 1). Routine intraperitoneal irrigation and aspiration with saline at room temperature were performed after the laparoscopic procedures in all patients. Serum CA-125 levels were evaluated 24 hours before and after the laparoscopic procedure.

CA-125 Measurement

CA-125 was determined by Immulite OM-MA, Diagnostic Products Corporation (DPC, Gwynedd, U.K.) which was a solid-phase, chemiluminescent enzyme immunometric assay. It was used with the Immulite, DPC automated analyzer.

Table 1. — *Laparoscopic procedures and serum CA-125 levels.*

	Number of patients	CA-125 level (U/ml)	
		Before laparoscopy	After laparoscopy
Diagnostic laparoscopy	30	13.47 ± 3.88	13.87 ± 4.02
Laparoscopic uterine nerve ablation	16	14.18 ± 4.08	14.39 ± 4.16
Tubal ligation	32	13.19 ± 3.87	13.58 ± 3.91
Ovarian cystectomy	4	13.25 ± 3.74	13.49 ± 3.85
All patients	82	13.49 ± 3.90	13.84 ± 4.09

Statistical Analysis

Statistical analysis was done by SPSS statistical software. Data are presented as the mean-standard deviations. The statistical significance of change in serum CA-125 values was analyzed by the paired samples test. A p value of < 0.05 was accepted as statistically significant.

Results

Of 82 patients, 30 underwent diagnostic laparoscopy for infertility, 16 underwent laparoscopic uterine nerve ablation (LUNA) for dysmenorrhea and chronic pelvic pain, 32 underwent laparoscopic bipolar tubal ligation, and four underwent laparoscopic cystectomy. There were no complications during the laparoscopic procedures.

Mean serum CA-125 levels of the patients before and after the laparoscopic procedures were 13.96 ± 4.86 U/ml and 14.02 ± 4.96 U/ml, respectively. The change in serum CA-125 levels prior to laparoscopy was statistically insignificant when compared with the levels obtained at 24 hours after the laparoscopic procedure ($p > 0.05$).

Discussion

It is already known that a number of conditions lead to increased serum levels of CA-125. The main clinical importance of CA-125 is its role in both diagnosis and follow-up of ovarian malignancies. Besides this clinical implication, many other pathologic states in obstetrics and gynecology are believed to have some degree of a relation with CA-125 and measurement of its level may have a clinical role in both diagnosis and prognosis [10, 11].

During pelvic and abdominal surgeries, whether performed by laparotomy or laparoscopy, any surgical injury to the peritoneum causes an immediate release of inflammatory substances which will promote adhesion formation [12]. Minimization of serosal injury is the basis of modern surgical principles that led surgeons to the intensive use of laparoscopy; hence laparoscopic operations have substantially increased all over the world mostly due to the less invasiveness of the procedure. During trauma to the peritoneum it is likely that CA-125 antigens, present in the epithelium of the peritoneum, are released and their levels in circulation are increased. Therefore, one can speculate that measuring CA-125 levels could become an indicator of this peritoneal irritation. Data in the medical literature defining serum CA-125 levels after laparoscopy are unsatisfactory. In this study we investigated the effect of laparoscopy on serum CA-125 levels. It has previously been reported by Kappas *et al.* [13] that the main cause of peritoneal damage during surgical operations is mechanical trauma to the peritoneal surface, "drying" effect of CO_2 insufflation and copious irrigation of the peritoneum with saline. It has also been reported that non-malignant ascites, independent of the underlying primary cause, was found to be associated with increased serum CA-125 levels suggesting that the presence of fluid in the peritoneal cavity may stimulate CA-125 release [14]. In order to demonstrate peritoneal irritation in terms of CA-125 levels, the relationship between serum CA-125 levels and peritoneal irritation with some laparoscopic procedures such as tubal ligation, cystectomy and LUNA was evaluated. We found that diagnostic laparoscopy or laparoscopic surgical procedures did not change the levels of CA-125 at the 24th hour after laparoscopy indicating that either serum CA-125 levels are not correlated, at least within 24 hours, with peritoneal irritation or that peritoneal irritation is minimal or absent in our operations.

Although CA-125 is the one of the most commonly studied compounds, its biological function is not fully elucidated. A number of studies have pointed out several properties of CA-125 related to its function such as adhesion prevention of membranes [7], immune suppression during pregnancy in order to protect embryos from maternal immune rejection [15], an immunomodulatory effect in ovarian cancer [15], enhancing the invasiveness of benign endometrial cells which may play an etiological role in endometriosis [16]. As the use of laparoscopy is substantially increasing, especially diagnostic laparoscopy, over-treatment or misuse of this minimally invasive method raises the question of potential harmful effects in addition to the procedure's probable operative complications. Laparoscopy did not cause an increase in CA-125 levels in our study, thus when the unknown functions of CA-125 are considered, potential undesired effects related to CA-125 seem to be prevented.

In conclusion, despite the wide use of CA-125 in the detection and follow-up of ovarian carcinomas, serum CA-125 levels are increased in many other clinical conditions. The peritoneum is a major source of the CA-125 antigen and irritation and trauma to the peritoneum during surgical operations may cause elevated serum CA-125 levels. However, our results failed to show an increase in CA-125 levels after laparoscopy, suggesting that trauma or irritation of the peritoneum is minimal.

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