Frequency of Smooth Muscle Tumors and Adenomyosis in Patient with Previous History of Cesarean Section and the Fate of the Cesarean Section Scar: A Long Term Follow-Up Study

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Abstract
Leiomyoma and adenomyosis are two common pathologic entities encountered in hysterectomy specimens. It is often speculated, but not confirmed, that repeated injury to uterine wall may initiate smooth muscle proliferation resulting in a smooth muscle tumor. Similarly injury to the wall may lead to entrapment of endometrium in muscle layer leading to adenomyosis. To evaluate the above questions and assess the long term morphologic appearance of the C-section scar, 55 consecutive hysterectomies with previous history of C-section and 45 control cases were studied to evaluate the frequency of leiomyoma and adenomyosis. Our findings show no significant statistical difference in the frequency of such lesions between study and control groups in this series. Besides the scar formation, only rare instances of cystic change, osseous metaplasia and abnormal vasculature were noted at the site of C-section incision in the uterus.

Keywords: Cesarean section; Scar; Leiomyoma; Adenomyosis

Introduction
Adenomyosis and leiomyomata are often encountered in many hysterectomy specimens. Leiomyomata are the most common neoplasm of the uterus [1]. Clinically 20-30% women over 30 years have leiomyoma and the rate is even higher, up to 75%, when examined systematically [1,2]. The growth of leiomyoma has been shown to be affected by hormones [3]. However, the number of leiomyoma is possibly not determined by the hormonal status or intake. Using monoclonal smooth muscle proliferation in human atherosclerotic plaques as a model, Cramer et al. [4] suggested that excessive injury to and repair of the endometrial lining may promote monoclonal expansion of smooth muscle cell proliferation leading to leiomyoma formation. If this statement holds true, the uteri with previous history of C-section should have higher frequency of leiomyoma than the control group.

The incidence of adenomyosis is reported to be about 15% to 30% of hysterectomy specimens [5]. However, it is not known whether frequency of adenomyosis increases with C-section. In 1948 Novak and de Lima observed that pelvic endometriosis was present in 31.3% cases of adenomyosis [6]. It has been, however, observed that the prevalence of endometriosis is relatively low among multiparous women [7]. Endometriosis is often seen in the abdominal wall at the site of C-section.

Italian obstetrician Eduardo Porro, an author of cesarean section technique, performed the surgery by uterine corpus amputation and suturing of the cervix stump into the abdominal wall incision in 1876 [8]. The first modern Cesarean section of uterine lower segment transverse incision was performed by German gynecologist Ferdinand Adolf Keher 1881 [8]. During the last 10 Years, the cesarean section (CS) rate was increased despite of the recommendations of the World Health Organization to keep it below 10-15% [9]. In recent years the rate has risen to a record level of 46% in China and to levels of 25% and above in many Asian and European countries, Latin America, and the USA [9]. In the United States the rate of cesarean section has increased from 5.8% in 1970 to 32.3% in 2008 [10]. Maternal mortality has also been shown to have increased from 10 per 100,000 in 1998 to 14 per 100,000 in 2004 [10]. The increased cesarean section have resulted in an increased incidence of placenta accrete, blood transfusion, and possibly maternal mortality [10]. The traditional incision was a midline longitudinal incision in the past which offered a larger space to maneuver. However, it is rarely performed today as it is often prone to complications. The incision at lower uterine segment is the procedure of choice now and it involves a horizontal incision just above the edge of the bladder. The advantage of this incision is minimum blood loss. The incision line of the uterine wall heals well and does not usually give rise to any complications.

We elected to review the frequency of uterine fibroids and adenomyosis of the uteri in patients with history of a C-section and compare them with uteri without similar history. The long term morphologic changes of the incision scar was also noted and the changes in the area were also documented in consecutive hysterectomy specimens in the department of pathology, Women & Infants Hospital.

Materials and Methods
After obtaining written approval (approval # 12-0082) from the Institutional Review Board (IRB) of Women & infants Hospital, Providence, Rhode Island, USA, for conducting clinical study, consecutive hysterectomy specimens with previous history of C-section were examined by gross and microscopy in the department of pathology over a period of 1/1/2008 to 12/31/2008. The indications for hysterectomies were documented. Hysterectomies done for complications. The incision at lower uterine segment is the procedure of choice now and it involves a horizontal incision just above the edge of the bladder. The advantage of this incision is minimum blood loss. The incision line of the uterine wall heals well and does not usually give rise to any complications.
any malignancies were not included in the study. For comparison, hysterectomies without prior history of C-sections were also reviewed during the same time period. The morphologic changes of the C-section scar and the associated pathologic findings in the hysterectomy specimens were noted and the findings were compared with the control group. Unpaired t-test was done to compare the age of the two groups.

The scars were examined and any notable changes were noted. The date of original C-section when available was recorded to determine the age of the scar. The associated lesions in the uterus were also recorded.

The age range of the patients, number of prior C-section and other microscopic pathology were noted.

Results

A total of 55 cases were identified which fulfilled the criteria of our study. For comparison 45 consecutive cases of hysterectomy specimens with no previous history of C-section were retrieved. The hysterectomies were done for non-malignant cause and the indications for hysterectomies were the followings: prolapsed, fibroid uterus, menorrhagia, pelvic pain, stress incontinence, dysfunctional uterine bleeding, prophylactic hysterectomies due to family history of cancer, and adenomyosis.

Table 1 shows the comparison of age of two groups. Table 2 shows the number of C-sections preformed. Table 3 shows the time span between hysterectomy and previous C-section. The frequency of leiomyoma and adenomyosis in hysterectomies with and without C-sections are shows in Table 4. Table 5 shows the gross and microscopic findings of study group.

Discussion

We have examined the frequency of leiomyoma and adenomyosis in the uterus with and without the previous history of cesarean section where hysterectomy was done for benign reasons. The histomorphologic changes of the old C-section scar site in the uterus were also examined. Hysterectomy specimens were grossly examined and sections were submitted to evaluate the histologic changes. The most consistent gross feature seen was depression (thinning) at the site of the scar.

Of all these cases of C-section 64% of cases had associated leiomyoma. Leiomyoma was found in 64.4% cases during the same time period in hysterectomies without C-section (p=NS). It is interesting to note that hysterectomies with or without previous history of C-section have an almost identical rate of leiomyoma. One can safely speculate that C-section does not trigger the formation of leiomyoma. It may have
been possible that because of the leiomyoma, C-section was necessary. However, the current study was not designed to specifically answer that question.

Similarly the frequencies of adenomyosis in study and control groups are also similar; 56% versus 53.3%. Although a slightly higher frequency is noted in the C-section group, the difference is not statistically significant (p=NS). The number of previous C-sections in the study group did not contribute to the changes noted in the uteri of the study group compared to the control group. The microscopic changes were not influenced by the number of C-sections previously performed or the duration between the last C-section and time of hysterectomy.

All the leiomyomata found in the study group were benign. No cytologic atypia or malignancy is noted in either group.

It is difficult to determine whether cesarean section induces adenomyosis or not. It is also possible that presence of preexisting adenomyosis may have necessitated the cesarean section.

Despite the reports in the literature of the presence of endometriosis and leiomyoma at the site of cesarean section scar, no such occurrences were noted in the current series. No evidence of implantation site nodule is seen at the scar site in patients with multiple previous C-section.

In conclusions, despite the apparent increase in the C-section rate in the USA, the frequency of leiomyoma and endometriosis and/or adenomyosis remains the same. So it appears that C-section, which induces a reparative reaction do not induce uncontrolled proliferation of smooth muscles leading to a leiomyoma or trap endometrium leading to adenomyosis.

No significant difference in leiomyoma or adenomyosis is noted as far as the age of the patient. Besides the presence of a scar no other significant morphologic changes were noted at the site of scar with the exceptions of rare cystic change, osseous metaplasia and abnormal vasculature.

References