Özgün Araştırma / **Original Article**

Sezaryen Sonrası Vaginal Doğumu Takiben Oluşan Uterus Rüptürü: Antenatal Takibi Olmayan Gecikmiş Vakalardaki Klinik Yönetim ve BT bulguları

Uterine Rupture Following Vaginal Birth After Caserean Section (VBAC): Clinical Management and CT Findings in Delayed Cases without Antenatal Care Follow-up

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ÖZ

Amaç: Sezeryan sonrası vajinal doğum (SSVD) nedeniyle oluşan ve kliniğe geç başvuru yapan antenatal takibi olmayan uterus rüptür (UR)'lü hastalardaki intraabdominal komplikasyonların tanısında bilgisayarlı tomografi (BT)'nin etkinliği, hastaların tedavi yönetimi ve klinik seyirlerinin tartışılması amaçlandı.

Gereçler ve Yöntem: Temmuz 2015 ile Şubat 2020 tarihleri arasında, Somali Mogadişu Recep Tayyip Erdoğan Eğitim ve Araştırma hastanesi'ndeki 5820 doğum arasından UR gelişen 21 hasta incelendi. Sezaryen öyküsü olmayanlar, semptom olmaksızın uterus skarının ayrıştığı hastalar ve gestasyonel yaşı <28 hafta olanlar çalışma dışı bırakıldı. Hastaların klinik ve laboratuvar verileri, torakoabdominal BT'leri elektronik kayıtlardan retrospektif olarak değerlendirildi.

Bulgular: Çalışmaya dahil edilen 15 hastanın ortalama maternal yaşı 25.06 ± 5.46 (18-32 aralığında) yıl idi. Hastaların 9 (%60)'unda bir ve 6 (%40)'sında iki sezeryan öyküsü mevcuttu. İki doğum arasındaki süre ortalama 14.57 ± 3.35 (11-19 aralığında) ay idi. Hastaların hiçbirinde antenatal takip yoktu. Fetal ve maternal mortalite gelişen 2 (%13.3) hastada fetüsün peritoneal kaviteye doğduğu tespit edildi. Vajinal doğumu takiben hastaneye başvuru süreleri ortalama 16.6 ± 1.99 gün idi. Postoperatif yoğun bakıma alınan 8 (%53.3) hastanın yoğun bakımda yatış süresi 2.26 ± 3.10 (2-8 aralığında) gün ve tüm hastaların hastanede yatış süresi ortalama 13.13 ± 4.13 gün idi. 8 (%53.3) hastaya total abdominal histerektomi yapıldı. 13 (%86.6) hastanın mevcut BT'lerinde sırasıyla uterus duvar defekti ve peritonit (n=13; %100), intraabdominal apse (n=11; %84.6), asit (n=10; %76.9), uterin kavitede hava, paralitik ileus ve pnomoni (n=8; %61.5), plevral effüzyon (n= 5; %38.4) ve splenik enfarkt (n=1; %7.6) mevcuttu.

Sonuç: Somali gibi gelişmemiş ülkelerde antenatal takibi olmayan gebe prevalansı yüksektir. Özellikle SSVD planlananlarda doğum öncesi antenatal takibin erken başlatılması ve donanımlı merkezlerde bu işlemin yapılması gerekmektedir. Ayrıca gecikmiş UR'li hastalarda oluşan komplikasyonların değerlendirilmesi, doğru tanı ve tedavi yönetimi açısından hastalara hızlı ve güvenilir olan BT yapılması gerekliliğine inanıyoruz.

Anahtar kelimeler: Sezaryen sonrası vajinal doğum, uterus rüptürü, intraabdominal apse, bilgisayarlı tomografi, geç prezantasyon

ABSTRACT

Aim: This research was aimed the show of the effectiveness of computed tomography (CT) in the diagnosis of intraabdominal complications in patients with uterine rupture (UR) due to vaginal birth after caesarean section (VBAC) and admitted to the clinic late. It was aimed to discuss the treatment management and clinical course of patients.

Materials and Method: Between July 2015 and February 2020, 21 patients who developed UR among 5820 births in the Mogadishu Recep Tayyip Erdogan Hospital in Somalia were examined. Those without a history of caesarean section, patients with uterine scar dehiscence without symptoms, and gestational age <28 weeks were excluded. Clinical and laboratory data and thoracoabdominal CTs of the patients were evaluated retrospectively from electronic records.

Results: The mean maternal age of 15 patients included in the study was 25.06±5.46 (range 18-32) years. There were one caesarean history in 9 (60%) patients and two caesarean section history in 6 (40%) patients. The mean time between two births was 14.57±3.35 (range 11-19) months. None of the patients had antenatal care (ANC) follow-up. In 2 (13.3%) patients who developed fetal and maternal mortality, it was determined that the fetus was born into the peritoneal cavity in these 2 patients. The mean duration of admission to the hospital after vaginal delivery was 16.6±1.99 days. The hospitalization period of 8 (53.3%) patients admitted to the postoperative intensive care unit was 2.26±3.10 (in the range of 2-8) days, and the mean hospitalization time of all patients was 13.13±4.13 days. 8 (53.3%) patients underwent total abdominal hysterectomy. In CTs of 13 (86.6%) patients, uterine wall defect and peritonitis detected in 13 of them (100%), intraabdominal abscess detected in 11 of them (84.6%), acid detected in 10 of them (76.9%), air in the uterine cavity, paralytic ileus and pneumonia detected in 8 of them (61.5%), pleural effusion detected in 5 of them (38.4%), and splenic infarction detected in 1 of them (7.6%).

Conclusion: The prevalence of pregnant women without ANC follow-up is high in underdeveloped countries such as Somalia. It is necessary to start antenatal follow-up early, especially in those who are planned VBAC, and this procedure should be done in equipped centers. Furthermore, we believe in the necessity of performing CT, which is fast and reliable for all patients, in terms of evaluating complications, finding correct diagnosis, and treatment management in patients with delayed UR.

Keywords: Vaginal birth after caesarean section, uterine rupture, intraabdominal abscess, computed tomography, late presentation

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INTRODUCTION

Uterine rupture (UR) is a rare and serious complication in those who have vaginal birth after caesarean section (VBAC). This complication is one of the most important causes of fetal and maternal morbidity and mortality (1). More than 90% of UR cases are associated with previous caesarean delivery (CD), and occurs in 0.2-1.5% of patients with low transverse incision, and 4–9% of patients with vertical or T-shaped incision (2). This condition is characterized by the separation of all layers of the uterine wall, including the serosal layer, and a direct connection between the uterine and peritoneal cavity. Since the first signs and symptoms of UR are nonspecific, it may cause delay in diagnosis and treatment. The diagnosis of UR is based on clinical and radiological basis. Although it is characterized by abnormalities in fetal heartbeat, worsening of abdominal pain, vaginal bleeding, and hemodynamic instability in the early stage, imaging methods should be used in diagnosis because of the nonspecific symptoms in delayed cases (3). Ultrasound (US) is the first choice radiologic modality because it can be performed bedside, does not contain ionizing radiation, and is relatively inexpensive. However, the computed tomography (CT) modality is the most preferred method today because the US has low success in showing the myometrial defect and other complications that may accompany UR. CT is the most commonly used modality due to its high sensitivity and reliability in detecting intraabdominal hematoma, abscess, uterine dehiscence, and rupture (3).

In this study, it was aimed to discuss the efficacy of CT in the diagnosis of intraabdominal complications in patients with UR, who developed UR due to VBAC and applied late to the clinic and the clinical course of these patients together with the management of treatment.

MATERIALS AND METHOD

Patient data and definitions

For this study, the records of 21 patients who developed UR between 5820 births between July 2015 and February 2020 at the Somali Mogadishu Recep Tayyip Erdogan Training and Research Hospital were retrospectively analyzed. Patients with primary UR without caesarean section history and without uterine scar, patients with uterine scar dehiscence without symptoms, and gestational age <28 weeks were excluded from the study. A total of 15 patients who had previous caesarean incision and had vaginal delivery (VD) and UR occurred were included in this study. Local ethics committee approval was received for this single-center retrospective study (date: 12.02.2020 and no: MSTH / 3405). UR was defined as the separation of all layers of the uterine wall, direct connection between uterine and peritoneal cavity (4). In addition to demographic, clinical, and laboratory data of the patients, their radiological records were obtained retrospectively from the hospital archive system. The patients' obstetric history, type of previous caesarean incision and SD numbers, time between two births, hospital admission time after VD, presence of fetal and maternal mortality, postoperative intensive care (POIC), and hospitalization times were recorded.

Evaluation of images

13 (86.6%) of the patients included in this study were scanned with thoracoabdominal CT with intravenous contrast (patients' kidney functions were normal). CT could not be performed in a patient who was taken to emergency laparotomy and in a different patient brought in with cardiac arrest, in total two patients. Thoracoabdominal CTs of the patients were evaluated in terms of UR, intraabdominal abscess, acid, peritonitis, ileus, pneumonia, and pleural effusion. In CT, UR was defined as a focal hypoattenuating defect in the myometrium, which also includes serosa and extends to the parametrial tissue.

Loculated fluid collections with air in the intraabdominal space accompanying rupture were defined as abscesses.

Thickening and enhancement in the peritoneal membrane were evaluated as peritonitis. The free liquid in the peritoneal cavity was defined as acid. Distension in the intestinal structures and air-fluid levels were defined as ileus.

Statistical analysis

All analyses were done using SPSS v. 22.0 Software (IBM SPSS Statistics Version 22.0. Armonk, NY: IBM Corp.). Categorical variables were expressed as frequency and percentage, and continuous variables as mean and standard deviation.

RESULTS

Among 5820 births in total, 15 (0.26%) patients included in the study developed UR due to caesarean scar. Demographic data and obstetric stories of 15 patients included in the study are shown in Table 1.

Table 1. Demographical Data of Uterine Rupture Following Vaginal Birth After Caesarean Section Patients

	Uterine Rupture n = 15
Obstetric history	
Gestational age, week	39.20 ± 2.67
Maternal age, year	25.06 ± 5.46
Gravidity number, median (range)	4 (2-6)
Grand multiparity (parity $\geq$ 5), n (%)	7 (46.6)
Time between two births, month	14.57 ± 3.35
Previous Caesarean Section History	
One Caesarean Section History, n (%)	9 (60)
Two Caesarean Section Histories, n (%)	6 (40)
Low transverse incision, n (%)	5 (33.3)
Classic vertical incision, n (%)	10 (66.6)

None of the patients had antenatal care (ANC) follow-up. 8 (53.3%) of the patients delivered at home with the help of midwives and 5 (33.3%) of the patients delivered at another hospital. Fetus was born into the peritoneal cavity in 2 (13.3%) patients were brought to the emergency department. Fetal and maternal mortality developed in these two (13.3%) patients. One of these patients was brought to the emergency department with cardiac arrest, mortality occurred despite cardiopulmonary resuscitation. In the bedside USG, it was determined that the fetus was in the peritoneal cavity outside the uterus and there were no fetal heartbeats. Another patient in whom the fetus was born into the peritoneal cavity was taken to the operating room due to hemodynamic instability and a laparotomy was performed. The laparotomy revealed that the fetus had no heartbeat and fetus was dead. Total abdominal hysterectomy (TAH) was performed on the patient who had intraabdominal infected acid and hematoma. In this patient who was followed up in postoperative intensive care (POIC), mortality developed on the 8th day due to septic shock and cardiopulmonary arrest.

There were preoperative thoracoabdominal CT images of the other 13 (86.6%) patients, except for two patients whose fetus was born into the peritoneal cavity. As summarized in Table 2, when the CTs of these patients are evaluated; All 13 patients with UR had defect and fluid in the uterine cavity and 8 (61.5%) of them had air in the uterine cavity (Figure 1). In 11 (84.6%) of these patients, intraabdominal abscess was present (Figure 2).

Figure 1. Axial section CT images of a 29 years old female patient who had uterine rupture and intraabdominal abscess. a) Focal defect in all layers of uterine cavity (white arrow) and air inside of uterine cavity (black arrow). b) Abscesses filled with air in the Douglas pouch and in the periuterine area (white arrow)
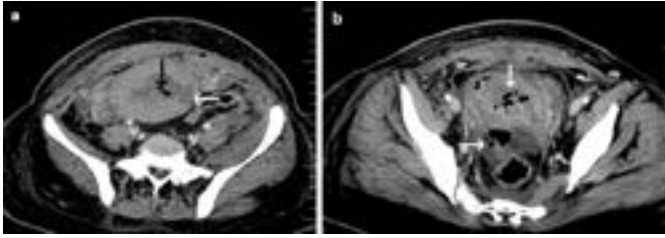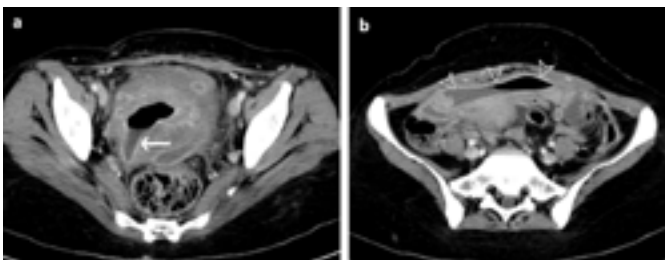

Figure 2. Axial section CT images of a 25 years old female patient. She admitted to the emergency service at postpartum 17th day with sepsis. a) Focal defect at uterine wall (white arrow) and the extension of the air-fluid in the uterine cavity into the defect is monitored. b) Abscess in the peritoneal cavity and thickening of peritonea (arrow heads).

The average diameter of the abscesses was 76.8 ± 38.5 mm. Diffuse acid in 10 (76.9%) patients, localized or diffuse peritonitis in 13 (100%) patients, paralytic ileus findings in 8 (61.5%) patients (intestinal distension, air-fluid levels), pneumonia in 8 (61.5%) patients and 5 (38.4%) patients had pleural effusion. In addition, in a different patient, splenic infarct (7.6%) areas were present with intraabdominal acid and peritonitis (Figure 3).

Figure 3. Axial section CT images with contrast of a 20 years old female patient. She admitted to the hospital at postpartum 15th day. a) Subcapsular infarct zones at spleen (white arrow), thickening and enhancement of peritoneal membrane (arrowheads). b) İntraabdominal diffuse acid (asterisk)
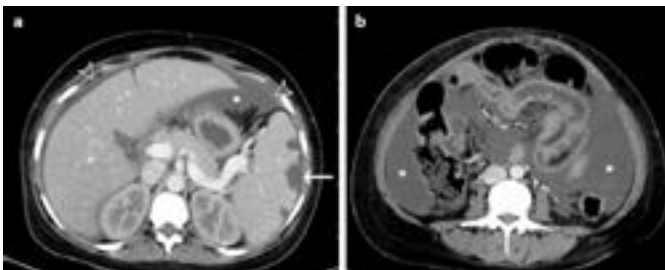

Table 2. CT Findings of 13 Uterine Rupture Patients

	Patients n = 13 (%)
Thoracic	
Pneumonia	8 (61.5)
Pleural effusion	5 (38.4)
Abdominal	
Uterine wall defect	13 (100)
Abscess	11 (84.6)
Acid	10 (76.9)
Peritonitis	13 (100)
İleus	8 (61.5)
Splenic infarct	1 (7.7)
Air in uterine cavity	8 (61.5)

All patients had signs and symptoms such as abdominal pain and tenderness, fever, tachypnea and respiratory distress at the time of admission, except for one patient brought with cardiac arrest. In blood gas analyses, findings compatible with respiratory alkalosis were observed in all patients. The clinical findings, course, and laboratory data of the patients are shown in Table 3.

Table 3. The clinical findings in the time of admission, laboratory data and clinical course of the UR patients

Clinical findings (time of admission) n (%)	
Abdominal pain, fever	14 (93.3)
Tachypnea, tachycardia	14 (93.3)
Vaginal bleeding	4 (26.6)
Sepsis	6 (40)
Laboratory data (time of admission)	
pH	7.47 ± 0.01
PCO2 (mmHg)	29.0 ± 4.72
WBC (x10³ cells/µL)	12.60 ± 2.70
CRP (mg/dL)	195.2 ± 154.2 (27.2- 395.8)
Clinical course	
Admission time after VD (day)	16.6 ± 1.99
Admission to POIC n (%)	8 (53.3)
Time in POIC (day)	2.26 ± 3.10
Time in hospital (day)	13.13 ± 4.13
Fetal and maternal mortality n (%)	2 (13.3)
Performed Surgery (n=14)	
Total abdominal hysterectomy n (%)	8 (57.2)
Primary surgical repair of the uterus n (%)	6 (42.8)

CRP: C-reactive protein, PCO2: Partial carbon dioxide pressure POIC: Postoperative intensive care unit, VD: Vaginal delivery, WBC: White blood cell count,

DISCUSSION

This study describes the clinical and radiological characteristics of UR that is formed due to VBAC, which is done at home or in non-equipped centers, without ANC follow-up. The continuing civil war in Somalia for a quarter of a century, the absence of a health system, the existence of low socioeconomic conditions, the absence of ANC follow-up and people's unconsciousness lead to this situation. Our hospital located in the capital is the only center in the region with the best equipment and healthcare personnel. However, very few pregnant women apply to the hospital at an early stage. Most of them present with impaired general condition 2-3 weeks after VBAC is tried. Patients included in our study had an average of 16.6 ± 1.99 days of admission to the hospital after VBAC.

There is a sharp increase in CD rates worldwide. This increase is due to many factors such as an increase in primary CD rates and a decrease in VBAC rates due to recurrent CDs. The primary CD rate in the United States was 14.6% in 1996 and 20.6% in 2008. While the decrease in VBAC rates corresponding to this increase was 28.3% in 1996, it was 8.3% in 2007 (1).

This increase in CD rates has led researchers to focus on VBAC. The most important point to consider in the VBAC trial is the risk of UR (5). In a study, the incidence of UR in women with previous caesarean incision was found between 0.2% and 1% (6). Similar to the literature, the incidence of UR was found to be 0.26% in this current study. UR usually occurs in the intrapartum period and is manifested by vaginal bleeding or abnormal fetal heartbeats. In addition, it is manifested by maternal hemorrhage accompanied by abdominal pain or tenderness in the early postpartum period. It is extremely rare for UR to be a late presentation. When we look at the literature, the data regarding UR belongs to the intrapartum and early postpartum period. Patients who developed UR in this study applied to the emergency department with advanced

thoracic and abdominal symptoms in the late postpartum period (16.6 ± 1.99 days). A significant proportion of patients were presented with sepsis (40%) and abdominal findings such as intraabdominal abscess, peritonitis and ileus. In addition, findings such as tachypnea, tachycardia and respiratory alkalosis were also detected in patients due to thoracic pathologies such as pneumonia (61.5%) and pleural effusion (38.4%).

Uterine rupture is generally clinically recognized in the intrapartum and early postpartum period and managed by emergency laparotomy. However, as in this study, further imaging methods are needed in cases where clinical signs and symptoms are advanced. Transabdominal and transvaginal US is used for this purpose to indicate the free fluid in the abdomen and to show increased post. However, advanced imaging methods such as CT and magnetic resonance imaging (MRI) are used because US is insufficient to show the defect in the uterine wall and intraabdominal complications in advanced cases. Compared with CT, MRI does not contain ionizing radiation and it has excellent soft-tissue contrast (7). However, although there are a radiation hazard and soft-tissue resolution is not as good as MRI, CT is generally preferred over MRI because it is affordable, relatively easy to access, and fast. In rare cases, MRI is performed to clarify suspicious US and CT findings or to examine patients who are contraindicated to intravenous administration of iodinated contrast agents. Imaging findings of UR detected in the early postpartum period are indicated as focal defect of the uterus wall, hemoperitoneum, and hematoma in the broad ligament. In addition, the presence of air extending along the uterine wall defect towards the endometrial cavity in CT and the presence of acid in the peritoneal cavity with blood products are among the most important imaging findings of UR. However, as in this current study, the extension of the infected hematoma adjacent to the bladder into the myometrium and parametrial abscess is seen more common in patients presenting late to the clinic (8). In our study, CT was performed to detect thoracic and abdominal findings in all patients except two patients who were brought with cardiac arrest and underwent emergency laparotomy due to hemodynamic instability. The presence of intraabdominal abscess (84.6%), peritonitis (100%), ileus (61.5%), and acid (76.9%) was detected as an indirect finding of UR in most of the cases. According to these findings, in the presence of an appropriate clinical scenario, it is possible to say that CT for UR has a high diagnostic sensitivity. It is important to perform preoperative CT in order to determine the complications that may accompany and plan the surgery correctly before performing laparotomy in postpartum women who are suspected of having UR and applying late. Due to the presence of widespread peritonitis and abscess in such cases, it will not be easy to distinguish anatomical structures intraoperatively because there are adhesions and scars around the organs. Therefore, the chances of uterine protective surgery are also reduced in these patients. Uterine sparing surgery is possible when the entire uterus is alive and procedure does not threaten maternal life. Antibiotics, surgical repair, and debridement of necrotic tissue are the main components of treatment in uterine sparing surgery (9). Performing of TAH in 8 (57.2%) patients included in this study can be explained by the fact that the cases are at an advanced stage, the loss of viability of the uterine tissue, and the presence of morbidity that may threaten the life of the mother. In addition, in patients with delayed UR accompanied by intraabdominal abscess and peritonitis, it may be wise to consider surgical procedure after percutaneous abscess drainage (PAD) and appropriate antibiotic treatment to increase the chances of uterus-sparing surgery. Accordingly, in such patients, CT will be a guide not only for diagnostic purposes but also for PAD treatment. Morbidity in patients can be significantly reduced with CT-guided PAD.

Various factors that increase the risk of UR have been described in the literature.

These are: Type of previous caesarean incision (such as classical vertical incision), high number of previous CD, advanced maternal and gestational age, birth weight exceeding 4000 g, duration between two births <18-24 months, multiparity (especially grand multiparity), single layer suturing of the uterus wall at the previous CD and birth induction / augmentation. Contrary to all these factors, it was stated that previous VD significantly reduced the risk of UR (10). İn this research 60% of patients had caesarean section once, 40% of patients had caesarean section twice, 66.6% of the patients had a classic vertical incision, duration between two births of the patients was less than 18 months in average an 46.6% of the patients were grand multipar. These factors may cause UR in these patients. In addition, 53.3% of these patients delivered at home and 33.3% of them delivered the centers that did not have sufficient equipment for VBAC. As a result, serious complications of UR occurred in patients. Because of the factors such as poor socioeconomic conditions and education level in the region and inadequate access to the hospital, patients were admitted to the hospital in the late postpartum period, as a result of late admission, serious morbidity occurred. 57.2% of the patients were followed up in POIC and the length of hospital stay of the patients was long. Considering the factors and results mentioned above, it is vital for a woman who chooses VBAC to perform this procedure in centers where there is enough surgical equipment for emergency hemostasis in terms of hemorrhagic complications due to risks such as UR and VBAC failure. In addition, due to the risk of abnormal placental insertion (such as placenta accreta) to caesarean scar, it is recommended to perform this procedure in centers where there is rapid and continuous access to blood products and has POIC unit for the mother (11).

In previous studies, it was found that maternal and fetal mortality was more common in UR cases. Kenichiro et al. (6) found that maternal morbidity in UR was 40 times higher and perinatal deaths in UR was 33 times higher than normal in their extensive studies examining 29 countries, and this increased risk was related to the development level of the countries. In this current study, in accordance with the literature, UR occurred in women who had VD resulted in severe morbidity, as well as maternal and fetal mortality in 13.3% (n = 2) of patients.

The first limitation of this study was that the actual incidence of UR could not be determined, since women who underwent VBAC gave birth outside our hospital and the number of people who developed UR and could not come to the hospital was unknown. Secondly, UR can cause by labour induction or augmentation methods. But we could not reach on reliable data regarding these methods used on these patients. Third, the suture technique (single / double layer) performed in the previous caesarean sections was not detected.

CONCLUSION

The prevalence of pregnant women without ANC follow-up is high in underdeveloped countries such as Somalia. It is necessary to start ANC follow-up early, especially in those who are planned VBAC, and this procedure should be done in equipped centers. Systematic strategies should be developed to raise public awareness of VBAC and its complications and to educate women. UR resulting from VBAC is still an important complication associated with high morbidity and mortality today. It is more important to prevent UR and UR complications than treating of UR. It is vital to reduce risk factors such as uterine scar, multiparity, lack of ANC, false caesarean incisions, and performing VBAC at appropriate centers. In addition to this, we believe that in cases when UR is late, clinical findings and symptoms are not clear. So evaluation of complications, accurate diagnosis, and treatment management require rapid and reliable CT for all patients before surgery.

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