Case Report

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Combined and staged treatment of mesh erosion after hiatal hernia repair

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Abstract

Mesh erosion following hiatal hernia repair is a rare but serious postoperative issue. It can lead to esophageal stenosis, gastric and esophageal fistulae, and may necessitate extensive surgical tissue removal and reconstruction. Therefore, employing minimally invasive and appropriate treatment strategies is crucial for patient management. We present the case of a 65-year-old woman who experienced mesh erosion after hiatal hernia repair. She underwent laparoscopic surgery followed by staged endoscopic treatment, resulting in complete removal of the mesh with preservation of organs and avoidance of major surgery. This combined laparoscopic–endoscopic approach represents an optimal method for managing such complications.

Keywords:

Complication, hiatal hernia, mesh erosion, mesh repair

Introduction

Hiatal hernia occurs when an abdominal organ protrudes into the thoracic cavity through an enlarged esophageal hiatus. Laparoscopic hiatal hernia repair is a widely accepted treatment for this condition, favored by surgeons for its benefits, including shorter hospital stays and minimal trauma.[1] However, despite its effectiveness, the recurrence rate can be as high as 66% following a simple suture closure of the esophageal hiatus.[2] Recent studies emphasize that reinforcing the diaphragmatic angle and esophageal hiatus with meshes significantly reduces the risk of postoperative recurrence.[3,4] Yet the use of synthetic meshes may trigger an inflammatory response, leading to serious complications such as postoperative esophageal stricture and, in severe cases, mesh erosion into the esophagus. The consequences of erosion can be severe, often requiring complex management. Patients frequently need surgical intervention to remove the mesh and surrounding tissue, and in some instances, organ removal may be necessary, severely impacting their quality of life.

We present a case study detailing mesh erosion that resulted in esophageal stricture following laparoscopic hiatal hernia repair reinforced with synthetic meshes. We discuss the clinical presentation and treatment approach utilized to mitigate serious complications, thereby avoiding major surgical procedures and the need for organ resection, including the stomach and esophagus. Our management strategy entailed a staged treatment approach that incorporated both laparoscopic and subsequent endoscopic interventions.

Case

Patient history and hiatal hernia repair

A 65-year-old woman, with body mass index 18.07, who had previously undergone cholecystectomy due to cholecystitis, was admitted to the hospital for gastroscopy. She complained of recurrent epigastric pain, nausea, acid reflux, and nocturnal cough persisting for 1 year.

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The patient was diagnosed with type III hiatal hernia. She then underwent laparoscopic hiatal hernia repair and fundoplication (Nissen procedure). The hernia defect measured 6 cm in diameter, and to reinforce the diaphragmatic crura, a polypropylene mesh with an anti-adhesion membrane was employed after hiatus closure, the mesh size was about 7 cm in diameter, in Ω shape and around the esophagus, and the mesh was fixed in hiatus with a Prolene suture. Following completion of the surgery, the patient was discharged after 7 days and has since been undergoing regular follow-up appointments at the outpatient clinic.

Patient complaint and examination of dysphagia after hiatal hernia repair

Six months postoperatively, she began experiencing dysphagia and vomiting when consuming semi-liquid food or when eating rapidly, although she remained comfortable on a liquid diet. Over time, these symptoms progressed. Consequently, she sought medical attention and underwent gastroscopy 11 months after the operation. The procedure revealed less food retention in the upper esophagus, obstruction of the endoscopic passage, slight narrowing of the cardia, and a poorly defined dentate line.

Fifteen months post-surgery, the patient underwent gastroscopy again, revealing esophageal narrowing of approximately 31 cm from the incisors, impeding endoscope passage [Figure 1]. Subsequently, an upper gastrointestinal contrast study indicated the obstruction of the contrast medium passage through the cardia.

Treatment commenced at 16 months post-surgery, including three transendoscopic dilator esophageal dilatations within 1 week. While initially experiencing improvement in eating, symptoms recurred shortly afterward.

Two months post-endoscopic dilatation, the patient returned to the hospital for a computed tomography (CT) scan due to worsening of difficulties experienced during feeding. The scan revealed widening of her esophageal hiatus, displacement of part of the stomach fundus into the thoracic cavity, and partial esophageal dilatation, with a high-density contrast shadow visible in the lumen [Figure 2]. Consequently, she was diagnosed with esophageal stenosis resulting from mesh erosion. A redo operation was planned.

Combined and staged treatment of dysphasia after hiatal hernia repair

The laparoscopic procedure followed the standard trocar positioning for hiatal hernia repair. Dense adhesions were encountered during the operation, necessitating careful dissection. It was discovered that the mesh surrounding the hiatus had extended into the thoracic cavity, tightly adhering to the surrounding tissues. The lower esophageal tissues appeared edematous and prone to bleeding upon contact. The visible mesh was incised and removed from the esophageal hiatus [Figure 3]. Subsequently, two esophageal perforations, measuring approximately 0.5 and 0.8 cm in diameter, were identified on the right side of the esophagus and repaired with absorbable sutures [Figure 4]. A gastroscopy conducted before the conclusion of the operation confirmed that the gastroscope could pass through the cardia into the gastric cavity, with no mesh visible endoscopically.

Nine days post-surgery, a gastrointestinal contrast study revealed dilatation of the upper and middle esophagus, with narrowing at the cardia position; however, passage of the contrast agent into the gastric lumen was observed. The patient was able to eat slowly. Subsequently, over the next month, she experienced no further esophageal leakage, complications such as fever or infection, or significant reflux symptoms.

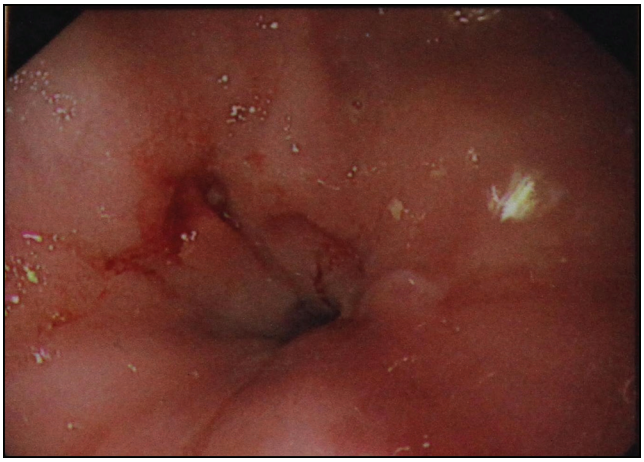

Figure 1: Gastroscopy showed the stenosis of the esophagus after hiatal hernia repair

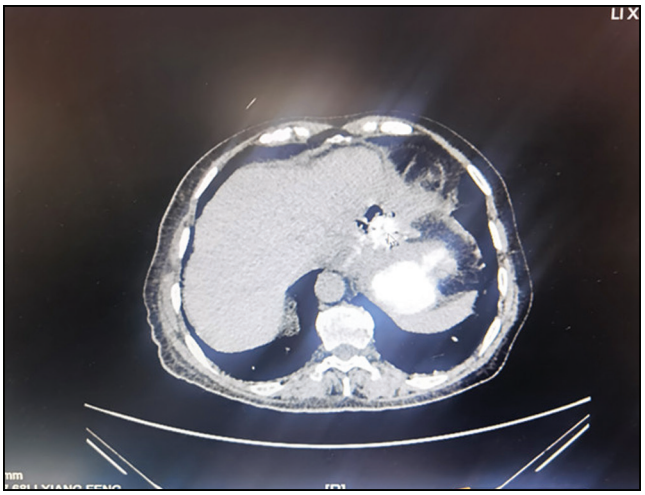

Figure 2: CT scan showed partial esophageal dilatation, with a high-density contrast shadow visible in the lumen

However, 2 months later, the patient presented again with dysphagia and postprandial vomiting. Gastroscopy revealed esophageal stenosis and the presence of an esophageal foreign body, which could not be extracted endoscopically. Consequently, the examination was halted, and the patient was transferred to a tertiary care hospital. A subsequent CT scan exhibited abnormal changes in the lower and middle esophagus and adjacent tissues, suggesting a possible esophageal–pleural fistula. The patient was diagnosed with "residual mesh erosion protruding into the esophagus." Following a multidisciplinary discussion involving surgeons, endoscopists, and the patient, a multiple-stage endoscopic removal procedure was deemed necessary.

Over the subsequent 2 months, the patient underwent monthly gastroscopic procedures to remove the esophageal mesh. During each session, a looped device was inserted, gradually extracting portions of the mesh in stages [Figure 5]. Given the considerable amount of mesh present, we opted not to attempt complete removal in a single procedure. Following each removal, we ensured that the gastroscope passed freely from the esophagus into the gastric cavity. The patient was advised to consume fluids initially and then transition to semi-solid foods until the next endoscopic examination.

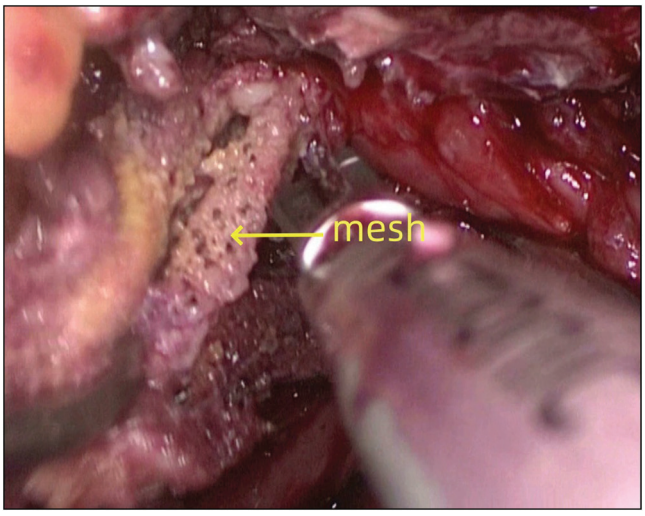

Figure 3: The visible mesh was removed by the laparoscopic procedure

As the treatment progressed, the patient's condition improved. By the third endoscopic mesh removal, all visible meshes inside the esophagus had been extracted. One month later, a confirmation endoscopy revealed no remaining meshes inside the esophagus. Finally, after such a phase of treatment [Figure 6], the patient reported complete resolution of dysphagia, vomiting, and other symptoms and could consume semi-liquid foods without any difficulty.

Discussion

Laparoscopic surgery has become the primary mode of treatment for hiatal hernia. While simple repair was previously favored for its straightforwardness, studies have shown recurrence rates as high as 42%.[5-7] Consequently, the majority of surgeons now opt for mesh repair to reinforce the diaphragmatic crura.[8,9] The use of prosthetic materials in the cleft area has been associated with significant mesh-related complications, such as erosion or migration into the upper gastrointestinal tract, esophageal perforation or stricture, and severe fibrosis within the hiatus.[10]

Synthetic meshes represented by polypropylene meshes can lead to severe abdominal adhesions due to their

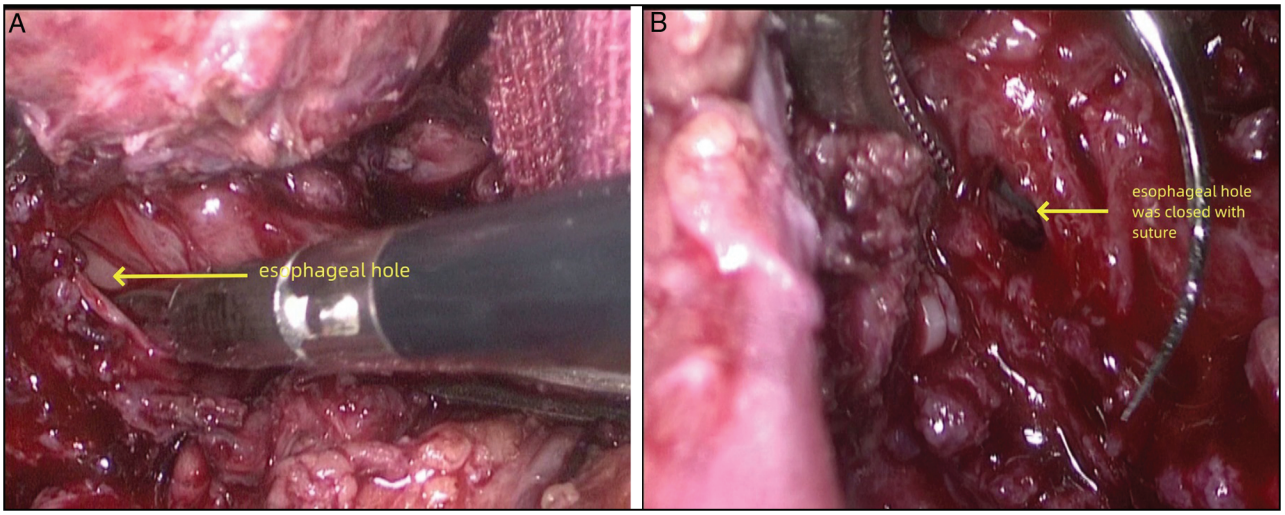

Figure 4: (a) After mesh removal, the esophagus perforation was observed. (b) Esophagus perforation was repaired with an absorbable suture.

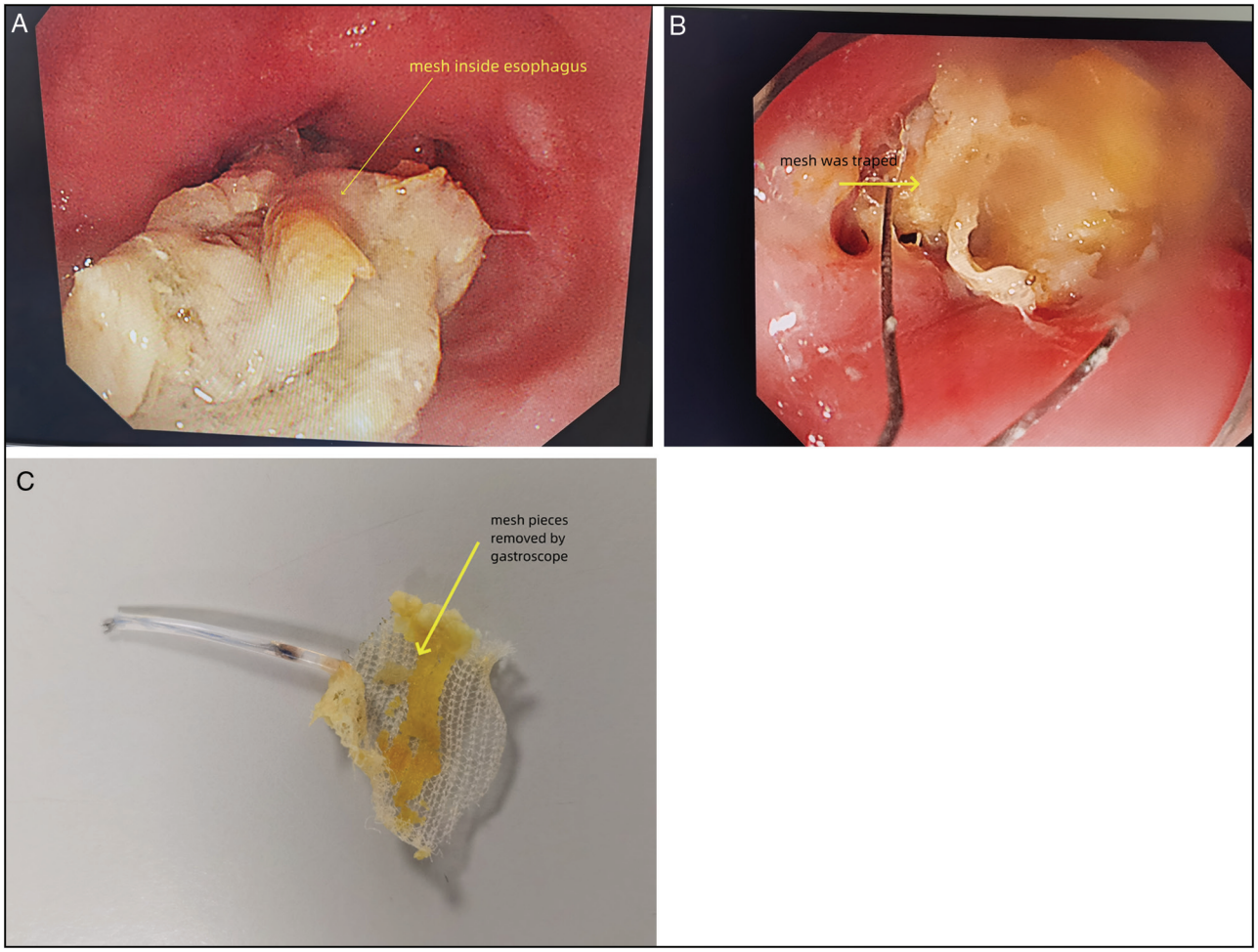

Figure 5: (a) Residual mesh was seen under the gastroscope. (b) Residual mesh was removed partially in a staged manner. (c) The mesh pieces were removed by using a gastroscope

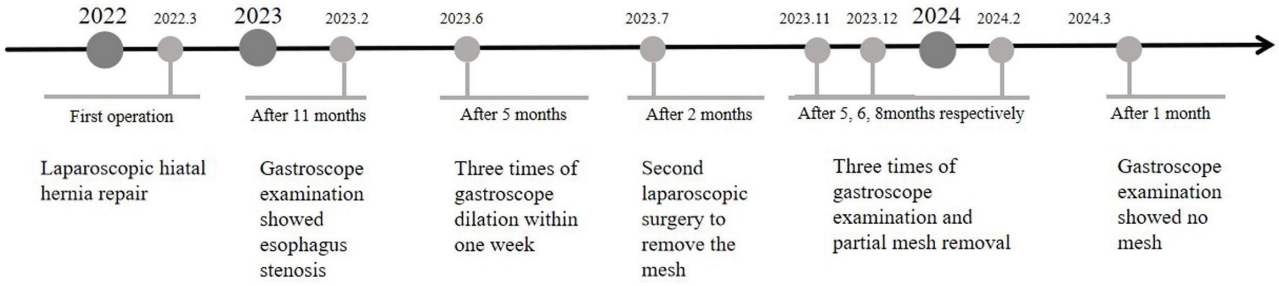

Figure 6: Timeline of all of the performed endoscopic and laparoscopic interventions

rough surface texture and direct contact with internal organs. Prolonged friction between the mesh and the stomach wall and esophagus can result in damage, potentially leading to erosion of these organs. Esophageal erosion can occur due to mesh displacement and a foreign body reaction, causing scarring at the base of the stomach and compression of the esophagus. This compression can cause various uncomfortable symptoms for the patient, such as pain, discomfort, and a sensation of a foreign object, ultimately leading to esophageal stenosis and potentially fistulas.[11,12]

Mesh erosion, though rare, poses a significant postoperative complication, and its true incidence remains unclear due to limited number of research studies. Reported incidence rates vary, with some studies indicating around 0.27%,[13] while others report absolute incidence rates of 1.9%–4.9%.[11,14,15] Given the potential for occurrence many years after hernia repair, cases are underreported. Despite its rarity, mesh erosion warrants consideration due to its potential for serious adverse events. Many studies on hiatal hernia repair surgery have not documented signs of infection, mesh migration,

erosion, or adjacent organ fistulae.[16,17] Consequently, there is limited research on minimization of these complications during treatment. However, managing erosion once it occurs is challenging. Hence, prevention of erosion during treatment is crucial.

It has been postulated that mesh migration tends to occur in the early postoperative period due to poor mesh fixation and the movement of the viscera. Subsequently, foreign body reaction and tissue erosion occur, which can result in failure to form a normal scar and the formation of a passageway into the hollow organ.[18,19] The constant motion of the esophagus, diaphragm, and esophageal hiatus poses a risk of mesh movement, potentially leading to its entry into the lumen and causing issues such as esophageal strictures. Therefore, placing the mesh at a safe distance from the esophagus is crucial in preventing erosion. However, excessive distance may increase hernia recurrence risk, necessitating careful consideration by the surgical team. Properly securing the mesh, ensuring correct size and shape, and preventing direct contact with the esophagus are vital during placement. When using synthetic meshes to repair hiatal hernia, we prefer keeping the mesh margin at least 0.5 cm away from the esophagus and fix the mesh with either a permanent suture or any type of tacks to prevent migration of the mesh into the esophagus. We do not know exactly what was the reason for mesh erosion in this case; however, we believe that large mesh size, Ω mesh shape, insufficient mesh-esophagus distance, or unstable mesh fixation are the problems. We recommend that when repairing the hiatus with a permanent mesh, surgeons should bear in mind that mesh erosion may occur as a result of improper utilization of a mesh.

If erosion occurs, early diagnosis and treatment need to be initiated. Dysphagia is an early presentation symptom in patients with esophageal erosion. However, most patients present with dysphagia early after hiatal hernia repair, and it usually resolves after a few weeks. Thus, early erosion may be difficult to identify. If dysphagia is not resolved or worsens several weeks after operation, mesh migration and erosion must be ruled out by endoscopy.[20,21] Despite endoscopic dilation, the patient continued to experience persistent dysphagia, raising suspicion of mesh erosion, which was subsequently confirmed during further examination and treatment.

For esophageal erosion, management options vary. Less severe strictures may be treated with endoscopic esophageal dilatation to improve dysphagia symptoms. In severe cases, mesh removal may be necessary via endoscopic, laparoscopic, or surgical procedures. In some instances, patients may require resection and reconstruction of the esophagus and stomach. Stadlhuber *et al.*[22] reported 28 cases, including 17 cases of erosion associated with esophagoplasty using meshes, of which nine required major organ resection and six required esophagectomy. This shows that mesh erosion is a complication that can have serious consequences; therefore, the treatment of mesh erosion after hiatal repair was a difficult situation and was associated with higher morbidity and mortality.

There are no studies recommending the best way to treat the condition, and the choice of treatment can only be made in the context of the patient's specific situation and based on the experience of the doctor. In this case, we reported the successful treatment of mesh erosion into the esophagus by the combination of laparoscopic procedure and endoscopic procedure.

In this case, initial esophageal dilatation via gastroscopy proved ineffective, prompting laparoscopic mesh removal. To minimize tissue dissection and potential organ injury, only the visible mesh was resected. However, residual mesh might have remained, leading to subsequent invasion into the esophagus lumen, causing irritation, inflammation, and scarring. Subsequent endoscopic mesh resection was proven to be possible, effective, and minimally invasive. Through a combination of laparoscopic and endoscopic approaches, utilizing a staged strategy, all of the mesh erosion was addressed, preserving the organs (esophagus and stomach) and avoiding major surgery.

The present study suggests that in cases where mesh erosion occurs following hiatal repair, initiating laparoscopic surgery could be beneficial. However, surgeons should be mindful that there may be a portion of invisible mesh that remains unresected, potentially leading to erosion into the esophagus later. This subsequent erosion can be managed through endoscopic maneuvers, which can be performed multiple times in a month. By employing this strategy, extensive and destructive dissection is minimized, thus avoiding the need for organ resection. We believe this approach offers a promising alternative for addressing complicated postoperative complications.

Conclusion

Mesh is commonly used to minimize recurrence, but it can lead to complications such as erosion, which carries serious risks. Prompt diagnosis and proper treatment are essential. We contend that a combined approach of laparoscopic surgery and endoscopic treatment, coupled with a predefined strategy, could serve as a valuable and efficacious method for addressing this complication.

Author contribution

We certify that we have participated sufficiently in the intellectual content, conception and design of this work

or the analysis and interpretation of the data (when applicable), as well as the writing of the manuscript, to take public responsibility for it and have agreed to have our name listed as a contributor.

Ethical policy and institutional review board statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. For this retrospective study, formal consent is not required. This article does not contain any study on animals performed by any of the authors.

Declaration of patient consent

Informed consent was obtained from all individual participants included in the study.

Data availability statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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Not applicable.

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