THE FIRST TIPS SURGERY PERFORMED IN THE UDMURT REPUBLIC IN A YOUNG PATIENT WITH SECONDARY BILIARY CIRRHOSIS

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ABSTRACT

Treatment of patients with iatrogenic injuries of the biliary tract is the most difficult and important section in hepatobiliary surgery. When analyzing the causes, it was found that in 70–94 % of cases this type of injury is observed during cholecystectomy. We present a rare clinical case of the development of secondary biliary cirrhosis due to iatrogenic trauma of the biliary tract. This injury caused long-term suffering for the patient due to the further development of complications of cirrhosis, specifically of portal hypertension. The latter caused repeated recurrent profuse bleeding from varicose veins of the esophagus. The use of a minimally invasive transjugular intrahepatic portosystemic shunt procedure for the first time in the Udmurt Republic was of particular relevance in solving this problem. This procedure has become a key one in solving the abovementioned problems and will become the preventive measure for the cirrhosis progression in the future. It is also important to focus on prophylactic measures aimed at preventing iatrogenic injuries of the biliary tract, as this problem can cause irreversible complications. Prevention should include adequate examination and visualization of the bile ducts and gallbladder before surgery, their careful mobilization, compliance with the rules of operation with electrosurgical instruments, as well as the use of additional minimally invasive techniques such as choledoscopy, cholangiography and intraoperative ultrasound. Besides that, all manipulations should be carried out under strict control and clear visualization of instruments and anatomical structures of organs. The article provides a detailed description of the technique of transjugular intrahepatic portosystemic shunt surgery, as well as presents X-ray images obtained during this operation.

Key words: *biliary tract, iatrogenic trauma, cholecystectomy, biliary cirrhosis, transjagular intrahepatic shunting, TIPS*

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ПЕРВАЯ ОПЕРАЦИЯ TIPS, ПРОВЕДЁННАЯ В УДМУРТСКОЙ РЕСПУБЛИКЕ, ПО СПАСЕНИЮ МОЛОДОЙ ПАЦИЕНТКИ С ВТОРИЧНЫМ БИЛИАРНЫМ ЦИРРОЗОМ ПЕЧЕНИ

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РЕЗЮМЕ

Лечение лиц, получивших ятрогенные травмы желчевыводящих путей, является наиболее сложным и важным разделом в гепатобилиарной хирургии. При анализе причин установлено, что в 70–94 % случаев данный вид травмы наблюдается при холецистэктомии. На примере клинического случая нами представлено редко встречающееся в клинической практике развитие вторичного билиарного цирроза печени вследствие ятрогенной травмы желчевыводящих путей. Данная травма стала началом длительных страданий для пациентки ввиду развития в дальнейшем осложнения цирроза, а именно портальной гипертензии. Последнее стало причиной многократно рецидивирующих обильных кровотечений из варикозных расширенных вен пищевода. В решении данной проблемы особую актуальность имело применение малоинвазивной методики трансъюгулярного интрагепатического портосистемного шунтирования, которую использовали в Удмуртской Республике впервые. Данная операция стала ключевой в решении вышеизложенных проблем и в дальнейшем станет профилактической при прогрессировании цирроза печени. Также немаловажно сделать акцент на профилактические мероприятия, направленные на предупреждение ятрогенных травм желчевыводящих путей, ведь именно данная проблема стала причиной необратимых осложнений. К профилактике следует отнести адекватное обследование и визуализацию желчных протоков и желчного пузыря до оперативного вмешательства, тщательную их мобилизацию, соблюдение правил работы электрохирургическими инструментами, а также использование дополнительных малоинвазивных методик, таких как холедоскопия, холангиография, интраоперационное ультразвуковое исследование. Кроме того, все манипуляции должны производиться под чётким контролем и при ясной визуализации инструментов и анатомических структур органов. В статье приведено подробное описание техники трансъюгулярного интрагепатического портосистемного шунтирования, а также демонстрируются рентгеновские изображения, полученные в ходе данной операции.

Ключевые слова: *желчевыводящие пути, ятрогенная травма, холецистэктомия, билиарный цирроз, трансъягулярное интрагепатическое шунтирование, TIPS*

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INTRODUCTION

The factors that significantly increase the risk of iatrogenic trauma of extrahepatic bile ducts during laparoscopic cholecystectomy include congenital local anatomical features; variety of topographic-anatomical correlations; inflammatory and sclerotic changes in the area of the bladder neck, hepatoduodenal ligament; lack of adequate technological support; excessive increase in the number of electrocoagulation procedures; insufficient qualification and experience of the surgeon; incorrect traction and exposure; misidentification of anatomical structures of the hepatoduodenal zone; coagulation, clipping or crossing of structures without proper visual control of the instrument working part [1].

According to some reports, in 50 % of cases iatrogenic trauma is caused by the anomalies of biliary duct structure [2].

Secondary biliary cirrhosis of the liver is a diffuse proliferation of connective tissue of the hepatic parenchyma, followed by the organ architectonics disorder due to a long-term impairment in bile outflow and stagnation in the intrahepatic bile ducts system. The main etiological factor is the initial extrahepatic cholestasis that develops mainly due to biliary pathology, tumours and cholelithiasis (gallstones) [3]. However, this process can develop due to iatrogenic trauma of the choledochous duct, which is much less common than the above causes.

Among the life-threatening complications of cirrhosis is a portal hypertension syndrome, which can lead to the formation of a serious complication manifested as bleeding from varicose veins of the esophagus and upper third of the stomach. This complication takes 10–15 % in the structure of mortality of patients with cirrhosis [4]. In the present-day surgery, searching for effective methods of treatment of complications associated with a portal hypertension syndrome remains highly relevant. Minimally invasive techniques, namely X-ray endovascular interventions, are of great importance to solve this problem. This technique is transjagular intrahepatic portosystemic shunting (TIPS).

TIPS is a percutaneous minimally invasive technique through which it is possible to create a calibrated intrahepatic portosystemic shunt necessary for the treatment of portal hypertension. Self-expanding nitinol stent or coated stent is most commonly used as a shunt [5]. This shunt in modern practice is quite often used in the treatment of portal hypertension and represents a new way to connect the portal vein with hepatic veins. The operation provides good decompression of the portal system and is also characterized by its low invasiveness [6]. But this type of intervention has a number of potential complications, which include stenosis or shunt obturation. Balloon dilatation and placement of an additional stent are necessary to correct the complication. Another life-threatening complication of this technique is the development of hepatic encephalopathy. TIPS is commonly used as a short-term intermediate step before liver transplantation (LT), as this intervention preserves the anatomy of the liver and its gates [7].

CASE STUDY

Patient E., 31 years old, in 2009, she complained of repeated attacks of pain in the right subcostal area, periodic bloating after eating, nausea, weakness. On October 29, 2010 in the surgical department of one of the central district hospitals, the following operation was performed: laparotomy, cholecystectomy, drainage of the abdominal cavity. In the postoperative period bile secretion by drainage – up to 1 L per day. During this operation, iatrogenic trauma of the choledochous duct occurred. On November 05, 2010, relaparotomy, sanation, and drainage of the abdominal cavity were performed in the surgical department of the First Republican Clinical Hospital of the Ministry of Health of the Udmurt Republic. In May 2011, reconstructive surgery was performed in the First Republican Clinical Hospital of the Ministry of Health of the Udmurt Republic: transhepatic drainage of the left and right hepatic ducts on the small intestine loop switched off by Roux (hepaticojejunostomy). In 2013, drainage removal was performed with subsequent formation of a small enteroatmospheric fistula of the anterior abdominal wall, which closed after 1 month. Since June 2014, she noted worsening of her condition, jaundice, hepatic insufficiency; she was diagnosed with liver cirrhosis. On January 25, 2015 there was repeated bleeding from varicose veins of the esophagus; on January 30, 2015 – X-ray endovascular occlusion of the branches of the superior mesenteric artery (SMA). In 2015, 2017, the patient was treated in the gastroenterology department with the diagnosis: secondary biliary cirrhosis of the liver. Last hospitalization was in 2018 in the gastro department of the First Republican Clinical Hospital of the Ministry of Health of the Udmurt Republic for treatment of liver cirrhosis. After a while there appeared weakness, jaundice lasting about two months. She was bothered by skin itching, bleeding from varicose veins became more frequent, and in December 2021 there was an acute bleeding from the esophageal veins: the esophageal veins were dilated on fibrogastroscopy (FGS). On April 07, 2022, after a sharp deterioration of her condition, she was transported from the Republican Clinical Hospital by air ambulance to the First Republican Clinical Hospital of the Ministry of Health of the Udmurt Republic with bleeding for diagnosis and treatment.

According to the objective examination: the condition is severe. The patient is of an asthenic type. The position is active within the bed, paresis and paralysis are absent. The skin is pale, warm. Scleral icterus. Respiration is spontaneous, HR = 18/min. By auscultation: vesicular respiration, no rales. Percussion sound is pulmonary. Heart tones are rhythmic, clear. Blood pressure – 110/60 mmHg, pulse = 100 BPM. Tongue is dry, covered with gray plaque. The abdomen is soft, painless. Hepatic dullness is preserved. The gallbladder is not palpated. Rebound tenderness (Shchetkin – Blumberg's sign) is negative. Bowel peristalsis is audible. Tumor-like masses in the abdominal cavity are not palpated. Lumbar concussion symptom is negative on both sides. No edema.

According to clinical and biochemical blood tests, leukocytopenia (2.0×10^{12}/L), thrombocytopenia (64×10^{12}/L), anemia (3.09×10^{12}/L; HGB = 69), bilirubinemia (64 μmol/L) due to direct (25 μmol/L) and indirect (39 μmol/L) fractions, acid-base disorder (pH = 7.431) were noted. Transaminases (ALT, AST) are slightly elevated (250 u/l), total protein is within normal limits, as active infusion therapy was carried out.

Coagulogram from April 07, 2022: prothrombin time – 13.0; fibrinogen – 2.4; INR – 1.27; activated partial thromboplastin time (aPTT) – 37.2.

According to spiral computed tomography of abdominal cavity organs with intravenous bolus contrast enhancement: CT picture of liver cirrhosis with marked portal hypertension, splenomegaly, small peritoneal effusion. Postcholecystectomy condition, embolization of periapical portocaval anastomoses. Cholangiectasia.

As per FGS: erosive esophagitis, chronic gastritis with focal atrophy.

For technical and medical reasons, a liver biopsy was not performed.

Conservative treatment included hemostatic, infusion, gastroprotective and symptomatic therapy. Improvement of the condition was not observed, and repeated bleeding accompanied by decompensation could end in death.

This event occurred during the Plenum of hepatobiliary surgeons on portal hypertension, dedicated to the 110th anniversary of M.D. Patsiora's birth (Moscow, April 7-8, 2022), where the question of TIPS surgery was raised concerning this patient. After the critical deterioration of the patient's health condition, it was decided to invite postgraduate students of the Department of Intermediate-Level Surgery, Izhevsk State Medical Academy, an X-ray endovascular surgeon from the emergency hospital, and a general surgeon. The patient was prepared to undergo surgical treatment (TIPS). The surgery was performed under the supervision of the chief surgeon and professor of the Department of Intermediate-Level Surgery, Izhevsk State Medical Academy.

OP REPORT

Radiation exposure: absorbed dose – 15.2 mSv, maximum absorbed dose in the skin – 320 mGy, fluoroscopy time – 27.5 min. Under local anesthesia with 0.5 % lidocaine solution of 10.0 ml, and using ultrasound navigation equipment, puncture of the right internal jugular vein was performed. Afterwards, catheterization of the right intrinsic hepatic vein was performed with a Destination 7Fr Guiding Sheath (introducer) (Terumo Corporation, Japan) (Fig. 1). Under intravenous anesthesia with a Merit needle with a 30° angle for TIPS, puncture of the right branch of the portal vein was performed (Fig. 2). Next, a 0.035 guidewire was guided into the portal vein, and the needle was removed. In the area of the formed venous portosystemic shunt (PSS) in the liver parenchyma, predilation was performed with a balloon catheter of 5.5 mm diameter and 80 mm length to 10 atm. After balloon catheter removal, a delivery system with a mounted S.M.A.R.T. stent was installed in the shunt area. Flex Vascular Stent System (Cordis, USA) 10 × 60 mm (Fig. 3), which was deployed by inflating to 10 atm a balloon catheter with a diameter of 10.0 mm and a length of 40 mm (Fig. 4). The delivery system was removed, and phlebography was performed from a sheath (introducer) placed through the formed shunt into the portal vein (Fig. 5). The formed TIPS is functional, the stent is deployed. Further, phlebography of portal vein was performed, where an efferent dilated up to 10 mm venous network is visualized, coming from the loop of small intestine switched off by Roux, previously, before the operation, visualized on CT of abdominal cavity organs with intravenous bolus contrast enhancement. The system of guidewires and catheters was removed, aseptic dressing was applied to the area of puncture of the right internal jugular vein.

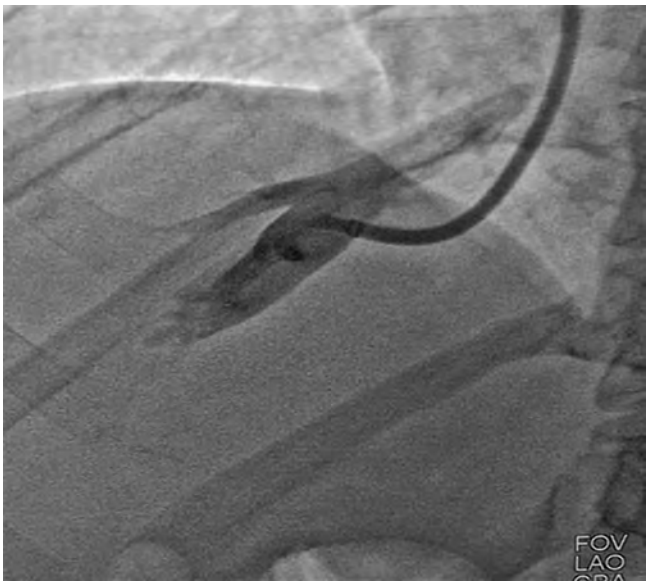

FIG. 1.
Patient E. Intraoperative X-ray image. Catheterization by an introducer and right hepatic vein angiography

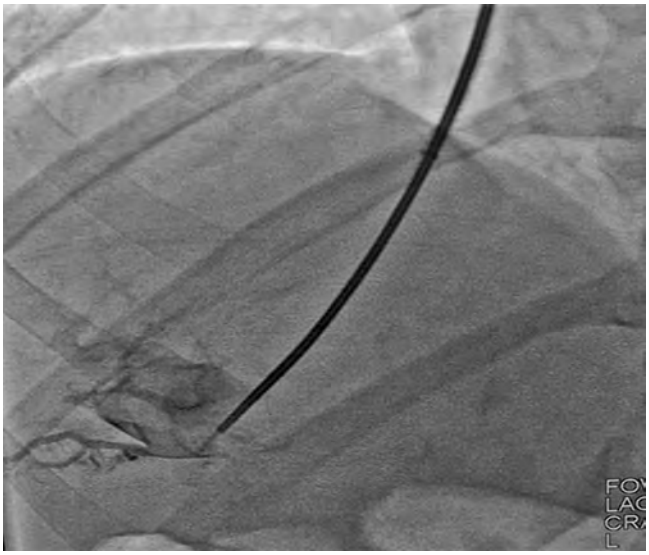

FIG. 2.
Patient E. Intraoperative X-ray image. The puncture stage, the needle is passed through the liver parenchyma into the portal vein

FIG. 3.
Patient E. Intraoperative X-ray image. Installation of the S.M.A.R.T. Flex Vascular Stent System

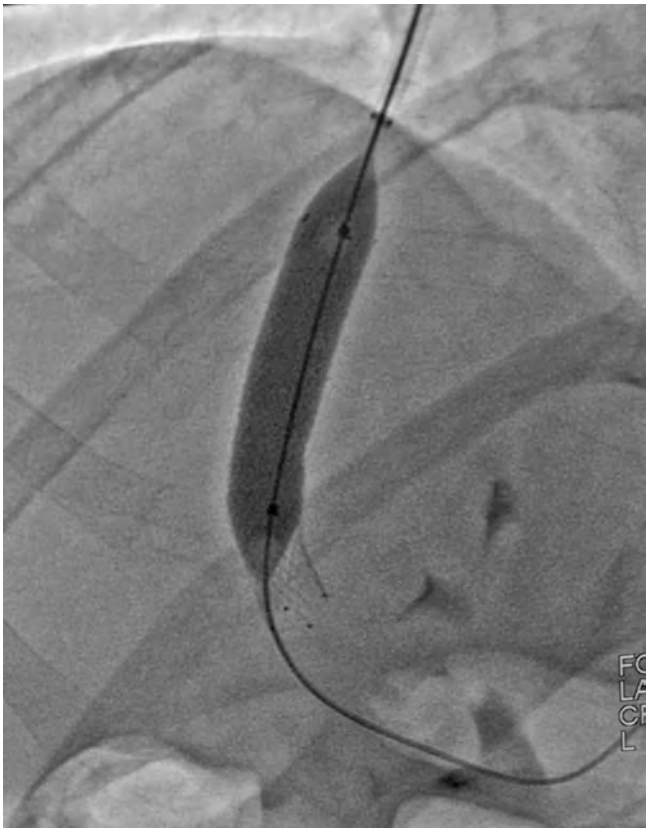

FIG. 4.
Patient E. Intraoperative X-ray image. Inflating the stent with a balloon

FIG. 5.
Patient E. Intraoperative X-ray image. Control angiography. TIPS visualization

As of April 12, 2022, the patient's condition has significantly improved, positive dynamics is observed. There was no evidence of recurrence and continued bleeding in the gastrointestinal tract. On April 15, 2022, the patient was successfully discharged. The patient was also prepared for the planned liver transplantation in Kazan under the supervision of the transplantology department head.

CONCLUSION

Thus, by the example of a clinical case, we presented a rarely encountered in clinical practice development of secondary biliary cirrhosis of the liver due to iatrogenic trauma of the biliary tract. This trauma caused long-term suffering for the patient due to the further development of complications of cirrhosis, specifically of portal hypertension. The latter was the cause of repeated heavy bleeding in the gastrointestinal tract, which could no longer be stopped by traditional methods of treatment. In this case, practitioners resorted to the use of minimally invasive techniques, namely, they successfully performed the first in the Udmurt Republic X-ray endovascular surgery on transjugular intrahepatic shunt. This procedure has become a key one in solving the above-mentioned problems and will become the preventive measure for the cirrhosis progression in the future. In modern surgical practice concerning portal hypertension syndrome, TIPS is a rather

effective method of decompression of the portal vein, allowing to achieve a decrease in the recurrence of bleeding from dilated veins of the esophagus and stomach.

It is also important to emphasize preventive measures aimed at prevention of iatrogenic traumas of biliary tract, because this very problem caused irreversible complications. Prevention should include adequate examination and visualization of bile ducts and gallbladder before surgical intervention, their careful mobilization, compliance with the rules of electrosurgical instruments, as well as the use of additional minimally invasive techniques, such as choledoscopy, cholangiography, intraoperative ultrasound. In addition, all manipulations should be performed under clear control and with clear visualization of the instruments and anatomical structures of the organs [8].

Conflict of interest

The authors of this article declare the absence of a conflict of interest.

The bioethical standards in conducting the required research were complied with and approved by the organization's committee (Minutes No. 732/1 dated 08.02.2022).

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REFERENCES

1. Galperin EI, Dyuzheva TG (eds). *Lectures on hepatopancreatobiliary surgery.* Moscow: Vidar; 2011. (In Russ.).

2. Khoron'ko YuV, Dmitriev AV. Transjugular intrahepatic portosystemic shunting (TIPS Procedure) and its influence on portosystemic hemodynamics in patients with portal hypertension. *Annals of HPB Surgery.* 2015; 20(1): 29-36. (In Russ.). doi: 10.16931/1995-5464.2015129-36

3. Kotiv BN, Dzidzava II, Bugaev SA, Onnitsev IE, Soldatov SA, Alent'ev SA, et al. Minimally invasive ways to treat and prevent gastroesophageal portal bleeding. *Annals of HPB Surgery.* 2022; 27(2): 48-57. (In Russ.). doi: 10.16931/1995-5464.2022-2-48-57

4. Zatevakhin II, Tsitsiashvili MSh, Shipovsky VN, Monakhov DV. Transjugular intrahepatic portosystemic shunting is an endovascular method for creating a porto-caval anastomosis. *Flebologiya*. 2008; 4: 10-16. (In Russ.).

5. Durleshter VM, Gabriel' SA, Korochanskaya NV, Buhtoyarov AYu, Markov PV, Murashko DS, et al. Transjugular intrahepatic portosystemic stent-shunt as minimally invasive method of portal hypertension correction in multi-disciplinary clinic. *Annals of HPB Surgery.* 2020; 25(4): 95-106. (In Russ.). doi: 10.16931/1995-5464.2020495-106

6. Shabunin AV, Bedin VV, Drozdov PA, Levina ON, Tsurkan VA, Zhuravel OS. First experience of transjugular intrahepatic portosystemic shunting at multidisciplinary hospital with a liver transplantation program. *Annals of HPB Surgery.* 2022; 27(1): 48-55. (In Russ.). doi: 10.16931/1995-5464.2022-1-48-55

7. Zatevakhin II, Shipovsky VN, Monakhov DV, Shaginyan AK. TIPS is a new treatment for complications of portal hypertension. *Annaly khirurgii*. 2008; 2: 43-46. (In Russ.).

8. Khoronko YuV, Sapronova NG, Kosovtsev EV, Khoronko EYu, Kantsurov RN, Ashimov IA. Selection of a portosystemic shunt placement procedure (TIPS) in the treatment of complicated portal hypertension. *Annals of HPB Surgery.* 2022; 27(2): 20-30. (In Russ.). doi: 10.16931/1995-5464.2022-2-20-30

ЛИТЕРАТУРА

1. Гальперин Э.И., Дюжева Т.Г. (ред.). *Лекции по гепатопанкреатобилиарной хирургии.* М.: Видар; 2011.

2. Хоронько Ю.В., Дмитриев А.В. Влияние операции TIPS на портосистемную гемодинамику у больных с портальной гипертензией. *Анналы хирургической гепатологии.* 2015; 20(1): 29-36. doi: 10.16931/1995-5464.2015129-36

3. Котив Б.Н., Дзидзава И.И., Бугаев С.А., Онницев И.Е., Солдатов С.А., Алентьев С.А., и др. Мини-инвазивные способы лечения и профилактики пищеводно-желудочных кровотечений портального генеза. *Анналы хирургической гепатологии*. 2022; 27(2): 48-57. doi: 10.16931/1995-5464.2022-2-48-57

4. Затевахин И.И., Цициашвили М.Ш., Шиповский В.Н., Монахов Д.В. Трансъюгулярное внутрипеченочное портосистемное шунтирование – эндоваскулярный метод создания портокавального анастомоза. *Флебология.* 2008; 4: 10-16.

5. Дурлештер В.М., Габриэль С.А., Корочанская Н.В., Бухтояров А.Ю., Марков П.В., Мурашко Д.С., и др. Трансъюгулярное внутрипеченочное портосистемное шунтирование как миниинвазивный метод коррекции портальной гипертензии в условиях многопрофильной клиники. *Анналы хирургической гепатологии*. 2020; 25(4): 95-106. doi: 10.16931/1995-5464.2020495-106

6. Шабунин А.В., Бедин В.В., Дроздов П.А., Левина О.Н., Цуркан В.А., Журавель О.С. Первый опыт применения трансъюгулярного внутрипеченочного портосистемного шунтирования в многопрофильном стационаре с программой трансплантации печени. *Анналы хирургической гепатологии.* 2022; 27(1): 48-55. doi: 10.16931/1995-5464.2022-1-48-55

7. Затевахин И.И., Шиповский В.Н., Монахов Д.В., Шагинян А.К. TIPS – новый метод лечения осложнений портальной гипертензии. *Анналы хирургии.* 2008; 2: 43-46.

8. Хоронько Ю.В., Сапронова Н.Г., Косовцев Е.В., Хоронько Е.Ю., Канцуров Р.Н., Ашимов И.А. Выбор портосистемного шунтирующего вмешательства (операции TIPS) при осложненной портальной гипертензии. *Анналы хирургической гепатологии.* 2022; 27(2): 20-30. doi: 10.16931/1995-5464.2022-2-20-30

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