

# Divided Laparoscopic Cholecystectomy for Unusual Gall Stones Complication of Mirizzi's Syndrome

Ahmed E. Lasheen,<sup>1,\*</sup> Mostafa Baioumy,<sup>1</sup> Mansour Morsy,<sup>1</sup> Wael Mahmoud,<sup>1</sup> Wael Mansy,<sup>1</sup> Ashraf

Ismail,<sup>1</sup> and Yasser Hussein<sup>1</sup>

<sup>1</sup>General and laparoscopic Surgery Department, Faculty of Medicine, Zagazig University, Zagazig, Egypt

\*Corresponding author: Ahmed E. Lasheen, General and laparoscopic Surgery Department, Faculty of Medicine, Zagazig University, Zagazig, Egypt. Tel: +20-552343035, Fax: +20-552307830, E-mail: lasheenahmed@yahoo.com

Received 2015 July 16; Revised 2015 October 02; Accepted 2015 October 10.

## Abstract

**Background:** Chronic complications of symptomatic gallstone disease such as Mirizzi's syndrome are rare. The importance and implications of these conditions are related to their associated surgical complications which are potentially serious such as bile duct injury and to the modern management when encountered during laparoscopic cholecystectomy.

**Objectives:** This research offers a technique to avoid surgical complications in Mirizzi's syndrome cases during laparoscopic cholecystectomy.

**Patients and Methods:** Between November 2012 and February 2015, 17 patients (12 females and 5 males) with mean age of 51 years (between 29 and 57 years) suffering from Mirizzi's syndrome underwent the divided cholecystectomy. In this technique the gall bladder was divided into two parts above the gall bladder infundibulum. The distal part was dissected for short distance and used to push liver up. The proximal part of gall bladder was cleared from all its contents and reevaluated from inside. Management was achieved according to the stage of disease.

**Results:** The mean operative time was 70 minutes (between 60 and 90 minutes). No biliary tract obstruction or leakage or stenosis was recorded in this patient group during the period of follow up (18 months).

**Conclusions:** Divided laparoscopic cholecystectomy is a safe and effective technique to face the unusual gallstones complications (Mirizzi's syndrome).

**Keywords:** Divided, Laparoscopic Cholecystectomy, Mirizzi's Syndrome

## 1. Background

Mirizzi's syndrome was described as a functional hepatic syndrome in 1948, due to impacted gallstone in cystic duct or in the gallbladder infundibulum (1). These complications are being encountered in 1% to 2% of patients with symptomatic cholelithiasis according to some recent series (2, 3). However, in underdeveloped countries, Mirizzi's syndrome is a more common condition with reported incidence ranging from 4.7% to 5.7% (4, 5). The pathophysiological process leading to the subtypes or stages of Mirizzi's syndrome, has been explained as an inflammatory phenomenon secondary to a pressure ulcer caused by an impacted gallstone at gallbladder infundibulum. The impacted gallstones together with the inflammatory response, cause first external obstruction of the bile duct, and eventually erode into the bile duct evolving into a cholecystocholedochal or cholecystohepatic fistula with different degrees of relation between the gallbladder and bile duct (6, 7). Serious complications as bile duct injuries are common during modern surgical management of Mirizzi's syndrome especially in undiagnosed cases (8,9).

## 2. Objectives

This study offers a new technique to face this complicated situation during laparoscopic cholecystectomy even if not diagnosed before surgery. This technique and its clinical results are discussed in this article.

## 3. Patients and Methods

Seventeen patients (12 females and 5 males) were included in this study at the General and Laparoscopic Surgery Department, Zagazig University Hospital, Egypt from November 2012 till February 2015, with mean age of 51 years (between 29 and 57 years). This study had approval from Ethical Committee of Zagazig University at September 2012. All information about the technique was discussed with all patients so that they gave written consent to include their data into our study. Past history of gallstone symptoms were present in all patients, but these symptoms became aggravated in patient's present history. In our examination, we found that: vital signs

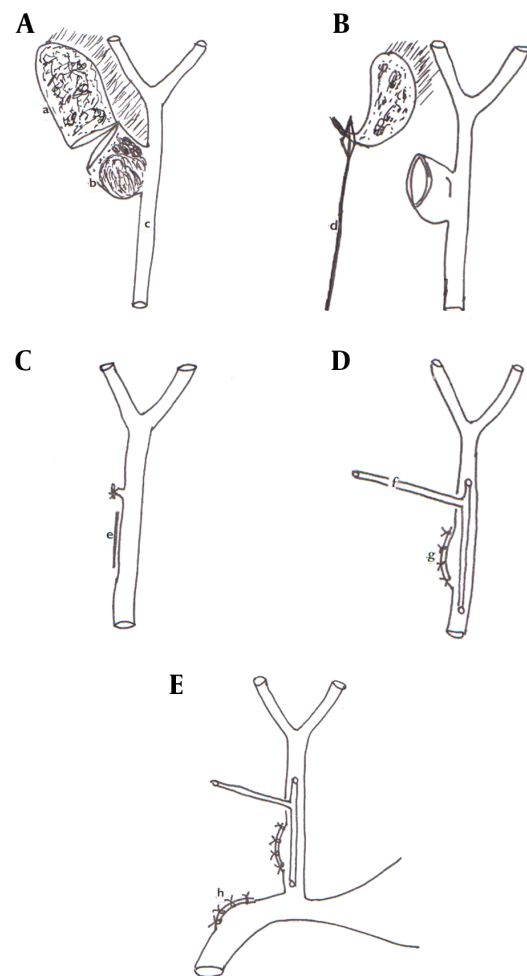
were stable, clinical jaundice was present in 15 patients (88%), mild tenderness in epigastrium and right hypochondrium was seen in all patients. Laboratory investigations were as follows: mean hemoglobin 11.7 gm%, leukocytosis (mean WBC count, 13,700/L), mean serum bilirubin 19.3 mg/dL and mean conjugated bilirubin 15.3 mg/dL, and liver enzymes were raised (mean alanine transaminase 53 IU/L, mean aspartate transaminase 47 IU/L, mean gamma-glutamyl transpeptidase 53 IU/L, alkaline phosphatase 177 IU/dL). Abdominal ultrasonography showed multiple gallstones, distended and thick-walled gallbladder and mild hepatic duct dilatation above the level of stone impaction (in 15 patients). Computed tomography (CT) identified gallbladder stones, thick wall and bile duct dilatation. In endoscopic retrograde cholangiopancreatography (ERCP), Mirizzi's syndrome was suspected in 15 patients (narrowing or extrinsic compression of hepatic duct with proximal dilatation and normal distal caliber). Magnetic resonance cholangiopancreatography (MRCP) showed impacted calculus compression on hepatic duct and dilatation of proximal bile duct.

### 3.1. Surgical Technique

Under general anesthesia, 4 ports as classical laparoscopic cholecystectomy were inserted after pneumoperitoneum was achieved. The reusable retrieval bag (10) was inserted into the peritoneal cavity through a 10-mm port and put under the inferior surface of the liver and its stoma near the gallbladder. The gallbladder was transected above the infundibulum dividing it into two parts (Figure 1A - E and 2A - F). Distal part of gallbladder formed from body and fundus of gallbladder was dissected for short distance as in retrograde cholecystectomy and then held by grasper to push the liver upward. The proximal part of gallbladder was formed from infundibulum and cystic duct. All contents of the proximal part are cleared by aspirating fluid content and putting the stones inside the retrieval bag. Then the stage of Mirizzi's syndrome was evaluated from inside of the proximal part by seeking a fistula to the bile duct or intestine (or not) and by opening the cystic duct. In stage I, we leave the part of gallbladder which was adherent to the bile duct after removal of mucosal layer and closed the cystic duct. In stages II, III, VI and V, the fistula to the bile duct or intestine was closed by two flaps of gallbladder wall around the fistula opening after insertion of a T-tube in the bile duct. Then, the dissection of the distal part of gallbladder was resumed. The retrieval bag with its contents was extracted from peritoneal cavity through one of the 10 mm ports. Suction and irrigation of the peritoneal cavity was done, the medium size J-Vac drain was inserted at the hepatorenal pouch. T-tube cholangiogram was done on the 2 week postoperative to show the flow and leakage

of contrast. Follow up period for this patient group ranged from 2 to 30 months (mean, 20 months) to see if any complications related to surgical procedure exist.

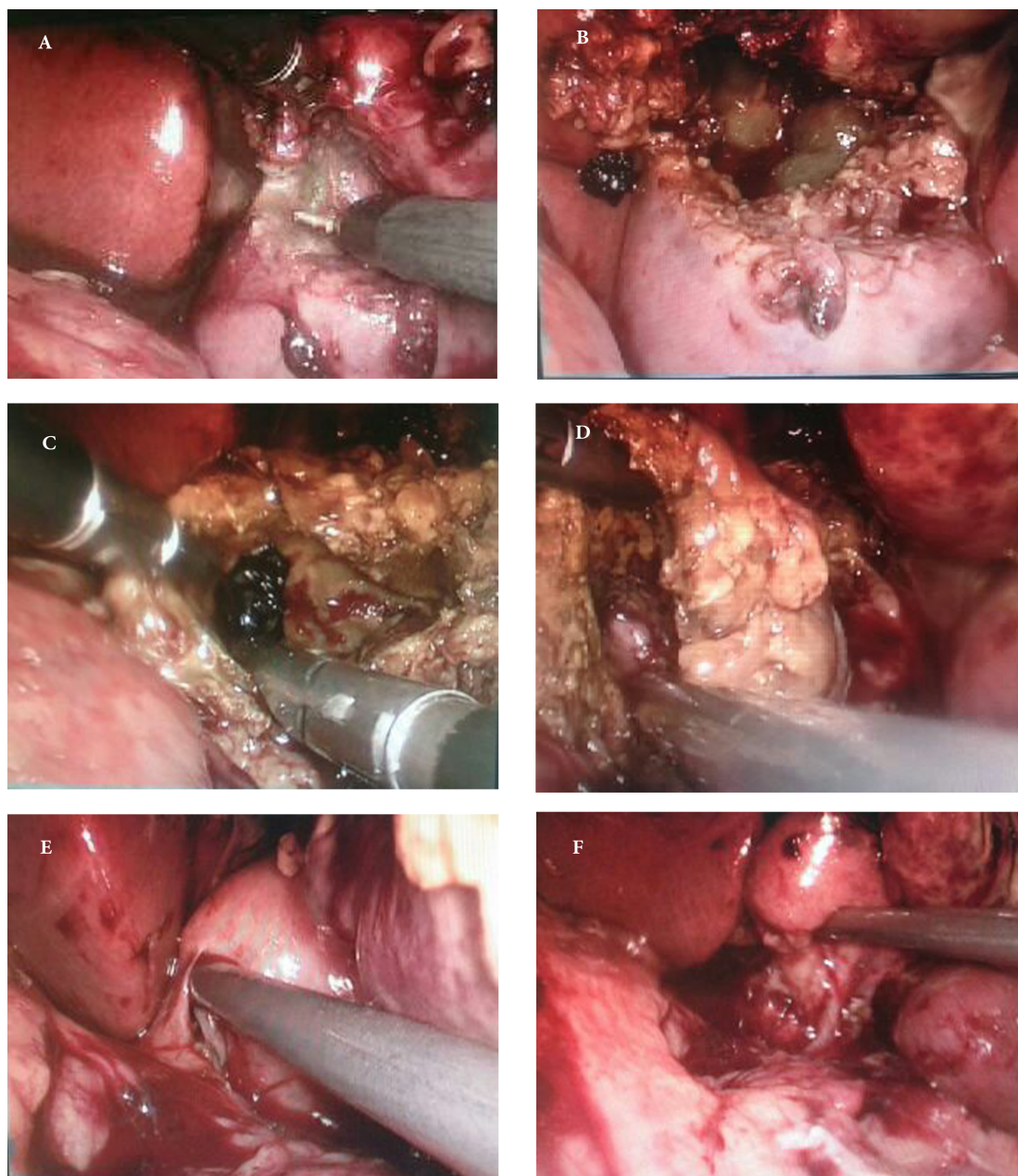
Figure 1. Schematic Illustration of the Procedure



A, Transection of gallbladder above the infundibulum; B, laparoscopic grasper pushes the distal part and liver up, and cleans all contents of proximal part; C, leaving part of gallbladder wall adherent to bile duct after removal of mucosal layer in type I of Mirizzi's syndrome; D, closure of the cholecystobiliary fistula by double gallbladder infundibulum flaps in type II, III and IV of Mirizzi's syndrome; E, closure of the cholecystobiliary fistula and cholecystoenteric fistula by double flaps of gallbladder in type V of Mirizzi's syndrome. a, distal part of gallbladder (body and fundus); b, proximal part (gallbladder infundibulum and cystic duct); c, bile duct; d, laparoscopic grasper; e, part of gallbladder infundibulum adherent to bile duct; f, T-tube; g, double flaps of gallbladder wall for closure of cholecystobiliary fistula; h, double flaps of gallbladder wall for closure of cholecystoenteric fistula.

## 4. Results

In our series, Mirizzi's syndrome was suspected preoperative in 15 patients (88%) and not in 2 patients (12%). The

**Figure 2.** Intra-Operative Views of the Procedure

A, Transection of gallbladder above gallbladder infundibulum is started by using hook attached with diathermy in an undiagnosed Mirizzi's syndrome case before operation; B, complete transection of gallbladder, showed massive inflammatory reaction in its wall and impacted stones in gallbladder infundibulum; C, after complete dividing of gallbladder, looking from inside, stones are impacted in infundibulum and cystic duct; D, after removal of all impacted stones and bile content, there is small fistula between gallbladder infundibulum and common bile duct (type II Mirizzi's syndrome); E, type I Mirizzi's syndrome, adhesion between gallbladder infundibulum and bile duct; F, leaving part of gallbladder infundibulum wall adherent to the bile duct, with removal of mucosa and then closing cystic duct and excision of the remaining part of infundibulum with cystic duct (Type I Mirizzi's syndrome).

plane of gall bladder division was just above the gall bladder infundibulum by using hook connected to diathermy. The presence of suction, irrigation and reusable retrieval

bag was essential through the procedure to clean the gall bladder contents. The distal half of gall bladder (fundus and body) was used to elevate the liver during procedure



and excised only at the end of operation. The Mirizzi's syndrome stage could be determined after clearance of proximal part (infundibulum and cystic duct) of the gallbladder from its contents and looking from inside. Mirizzi's syndrome stage I was present in 10 patients (59%) and stage II in 7 patients (41%). T-tube was inserted in bile duct in 7 patients (Mirizzi's syndrome stage II) and removed after 16 to 20 days post-surgery when cholangiogram showed free flow of contrast into duodenum and there was no evidence of leak. J-Vac drain was removed after more three days beyond T-tube removal. All patients had complete recovery within 25 days without any complications during the period of follow up.

## 5. Discussion

Mirizzi's syndrome is an uncommon complication and it occurs approximately on 0.5% to 4% of the patients carrying cholelithiasis. It is more frequent in women, probably being a reflection of the gallstones preponderance among this sex. It is the complication of long standing cholelithiasis (11, 12). The constant compression of the calculus associated with the inflammation of the involved structures may result in a fistula between gallbladder infundibulum or the cystic duct, and the extra hepatic biliary tract. In the cholecystobiliary fistula, the calculus may migrate into the main biliary tract, while in the coloenteric fistula the patient may show intestinal obstruction called biliary ileus (13). The importance of the recognition of the Mirizzi's syndrome derives from a high risk of injury to the biliary duct during surgical procedures. Summing up to this fact is the difficulty for the preoperative diagnosis because there is no specific clinical or laboratory presentation (14, 15). The Mirizzi's syndrome was previously classified into four types, but currently the cholecystoenteric fistula is being included as a same complication (type V of Mirizzi's syndrome) (5). The types are as follows: type (I) extrinsic compression of the common/choledocus hepatic duct by calculus in the gallbladder infundibulum or cystic duct; type (II) presence of cholecystobiliary fistula with erosion of a diameter less than 1/3 of the common/choledocus hepatic duct circumference; type (III) presence of cholecystobiliary fistula with erosion of a diameter of less than 2/3 of the common/choledocus hepatic duct circumference; type (IV) presence of cholecystobiliary fistula with erosion of a diameter more than 2/3 of the common/choledocus hepatic duct circumference; type (V) any type plus cholecystoenteric biliary fistula (type Va, without biliary ileus and type Vb, with biliary ileus) (16). Some authors do not consider laparoscopy as the first surgical option in this syndrome due to intense inflammatory process

caused by the disease, being even considered a contraindication to the minimally invasive treatment (5, 11). Before this study, according to some authors (11, 17) the best management of Mirizzi's syndrome was to avoid dissection of Calot's triangle in order to avoid injury to bile ducts and to perform a subtotal cholecystectomy with cholecystoenteric anastomosis. Recognition of this syndrome is important to avoid inadvertent ligation or severance of the bile duct. An attempt to expose Calot's triangle may lead to severe bile duct injury (18). In our technique, the preoperative diagnosis for Mirizzi's syndrome was not important, as the gallbladder was divided above the infundibulum in any suspected case in order to avoid dissection at Calot's triangle. After clearing all the contents of the proximal part of gallbladder, the stage of Mirizzi's syndrome would be recognized. The management was according to the stage of Mirizzi's syndrome: leaving a part of gallbladder infundibulum adherent to the bile duct after excision of its mucosa, or closing the fistula opening by using two flaps of the wall of gallbladder on both sides of the fistula after destruction or excision of mucosa, with inserting a T-tube through the bile duct. In previous studies, open operations for Mirizzi's syndrome was accepted as standard because the reported incidence rate of conversion to open cholecystectomy was remarkably high, with a range of 37% to 78% (19). In our study, all cases were completed by laparoscopic cholecystectomy without any injury to the bile ducts.

Dividing laparoscopic cholecystectomy offers effective technique to face unusual gall stone complications (Mirizzi's syndrome), whatever the diagnosis being recognized or not before the operation, without bile duct injury or conversion to the open technique.

## References

1. Jung CW, Min B, Song TJ, Son GS, Lee HS, Kim SJ, et al. Mirizzi's syndrome in anomalous cystic duct. *World J Gastrointestinal*. 2007;**13**:5527-9. doi: [10.3748/wjg.v13.i41.5527](https://doi.org/10.3748/wjg.v13.i41.5527).
2. Abou-Saif A, Al-Kawas FH. Complications of gallstone disease: Mirizzi syndrome, cholecystocholedochal fistula, and gallstone ileus. *Am J Gastroenterol*. 2002;**97**(2):249-54. doi: [10.1111/j.1572-0241.2002.05451.x](https://doi.org/10.1111/j.1572-0241.2002.05451.x). [PubMed: [11866258](https://pubmed.ncbi.nlm.nih.gov/11866258/)].
3. Luu MB, Deziel DJ. Unusual complications of gallstones. *Surg Clin North Am*. 2014;**94**(2):377-94. doi: [10.1016/j.suc.2014.01.002](https://doi.org/10.1016/j.suc.2014.01.002). [PubMed: [24679427](https://pubmed.ncbi.nlm.nih.gov/24679427/)].
4. Corts MR, Vasquez AG. Frequency of the Mirizzi syndrome in a teaching hospital. *Cir Gen*. 2003;**25**:334-7.
5. Beltran MA, Csendes A, Cruces KS. The relationship of Mirizzi syndrome and cholecystoenteric fistula: validation of a modified classification. *World J Surg*. 2008;**32**(10):2237-43. doi: [10.1007/s00268-008-9660-3](https://doi.org/10.1007/s00268-008-9660-3). [PubMed: [18587614](https://pubmed.ncbi.nlm.nih.gov/18587614/)].
6. Beltran MA. Mirizzi syndrome: history, current knowledge and proposal of a simplified classification. *World J Gastroenterol*. 2012;**18**(34):4639-50. doi: [10.3748/wjg.v18.i34.4639](https://doi.org/10.3748/wjg.v18.i34.4639). [PubMed: [23002333](https://pubmed.ncbi.nlm.nih.gov/23002333/)].



7. Beltran MA, Csendes A. Mirizzi syndrome and gallstone ileus: an unusual presentation of gallstone disease. *J Gastrointest Surg.* 2005;**9**(5):686–9. doi: [10.1016/j.gassur.2004.09.058](https://doi.org/10.1016/j.gassur.2004.09.058). [PubMed: [15862264](https://pubmed.ncbi.nlm.nih.gov/15862264/)].
8. Rohatgi A, Singh KK. Mirizzi syndrome: laparoscopic management by subtotal cholecystectomy. *Surg Endosc.* 2006;**20**(9):1477–81. doi: [10.1007/s00464-005-0623-6](https://doi.org/10.1007/s00464-005-0623-6). [PubMed: [16865619](https://pubmed.ncbi.nlm.nih.gov/16865619/)].
9. Antoniou SA, Antoniou GA, Makridis C. Laparoscopic treatment of Mirizzi syndrome: a systematic review. *Surg Endosc.* 2010;**24**(1):33–9. doi: [10.1007/s00464-009-0520-5](https://doi.org/10.1007/s00464-009-0520-5). [PubMed: [19466486](https://pubmed.ncbi.nlm.nih.gov/19466486/)].
10. Lasheen AE, Safwat K, Salem A, Allam Z, Awad W. Easy, safe, reusable, cost-effective specimen retrieval bag for laparoscopic surgery. *Surg Chron.* 2014;**3**:129–32.
11. Ibrarullah M, Mishra T, Das AP. Mirizzi syndrome. *Indian J Surg.* 2008;**70**(6):281–7. doi: [10.1007/s12262-008-0084-y](https://doi.org/10.1007/s12262-008-0084-y). [PubMed: [23133085](https://pubmed.ncbi.nlm.nih.gov/23133085/)].
12. Lacerda Pde S, Ruiz MR, Melo A, Guimaraes LS, Silva-Junior RA, Nakajima GS. Mirizzi syndrome: a surgical challenge. *Arq Bras Cir Dig.* 2014;**27**(3):226–7. [PubMed: [25184779](https://pubmed.ncbi.nlm.nih.gov/25184779/)].
13. Torres OGM, Melo LAL. Mirizzi syndrome. *Rev do Hosp Univ UFMA.* 2003;**1**:41–3.
14. Fonseca Neto O.C.L., Pedrosa M.G.L., Miranda A. Surgical management of Mirizzi syndrome. *Arq Bras Cir Dig.* 2008;**2**:51–4.
15. Safioleas M, Stamatakos M, Safioleas P, Smyrnis A, Revenas C, Safioleas C. Mirizzi Syndrome: an unexpected problem of cholelithiasis. Our experience with 27 cases. *Int Semin Surg Oncol.* 2008;**5**:12. doi: [10.1186/1477-7800-5-12](https://doi.org/10.1186/1477-7800-5-12). [PubMed: [18495037](https://pubmed.ncbi.nlm.nih.gov/18495037/)].
16. Johnson LW, Sehon JK, Lee WC, Zibari GB, McDonald JC. Mirizzi's syndrome: experience from a multi-institutional review. *Am Surg.* 2001;**67**(1):11–4. [PubMed: [11206888](https://pubmed.ncbi.nlm.nih.gov/11206888/)].
17. Schafer M, Schneiter R, Krahenbuhl L. Incidence and management of Mirizzi syndrome during laparoscopic cholecystectomy. *Surg Endosc.* 2003;**17**(8):1186–90. doi: [10.1007/s00464-002-8865-z](https://doi.org/10.1007/s00464-002-8865-z). [PubMed: [12739118](https://pubmed.ncbi.nlm.nih.gov/12739118/)].
18. Lledo JB, Barber SM, Ibanez JC, Torregrosa AG, Lopez-Andujar R. Update on the diagnosis and treatment of mirizzi syndrome in laparoscopic era: our experience in 7 years. *Surg Laparosc Endosc Percutan Tech.* 2014;**24**(6):495–501. doi: [10.1097/SLE.000000000000079](https://doi.org/10.1097/SLE.000000000000079). [PubMed: [25462668](https://pubmed.ncbi.nlm.nih.gov/25462668/)].
19. Cui Y, Liu Y, Li Z, Zhao E, Zhang H, Cui N. Appraisal of diagnosis and surgical approach for Mirizzi syndrome. *ANZ J Surg.* 2012;**82**(10):708–13. doi: [10.1111/j.1445-2197.2012.06149.x](https://doi.org/10.1111/j.1445-2197.2012.06149.x). [PubMed: [22901276](https://pubmed.ncbi.nlm.nih.gov/22901276/)].