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Original article

Evaluation of *Streptococcus pneumoniae* in bile samples: A case series review

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ABSTRACT

Although *Streptococcus pneumoniae* is an important pathogen of humans, pneumococcal cholangitis is rare because of the rapid autolysis of *S. pneumoniae*. The aim of this case series was to review patients with bile cultures positive for *S. pneumoniae*. This study was a single center retrospective case series review of patients with *S. pneumoniae* in their bile at a tertiary-care cancer center between September 2002 and August 2015. Subjects consisted of all patients in whom *S. pneumoniae* was isolated in their bile during the study period. Bile specimens for culture were obtained from biliary drainage procedures such as endoscopic retrograde biliary drainage, endoscopic nasobiliary drainage, and percutaneous transhepatic biliary drainage. There were 20 patients with bile cultures positive for *S. pneumoniae* during the study period. All patients presented with extrahepatic obstructive jaundice due to hepatopancreatobiliary tumors. Nineteen of 20 patients underwent the placement of plastic intrabiliary tubes. The mean time between the first-time drainage and the positive culture was 26 days (range 0–313 days). Although 12 of 20 patients met our definition of cholangitis, 5 were clinically treated with antibiotics based on a physician's assessment of whether there was a true infection. The present study is the largest case series of patients with *S. pneumoniae* in their bile. Based on our findings, the isolation of *S. pneumoniae* from bile may be attributed to the placement of biliary drainage devices.

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1. Introduction

Although *Streptococcus pneumoniae* is an important pathogen responsible for pneumonia, bacteremia, otitis media, and meningitis [1], pneumococcal cholangitis is less common [2]. We searched the PubMed database to find articles about the isolation of *S. pneumoniae* from bile in August 2015 using one or a combination of the following key words: *S. pneumoniae*, bile, pneumococcus cholangitis, and cholangitis. The results were restricted to only two articles [3,4]. As the rapid autolysis of pneumococci is seen in bile, viable pneumococci from bile are extremely unlikely. Bile solubility is the principle test for differentiating between streptococci and pneumococci [5,6]. Nevertheless, *S. pneumoniae* isolated from bile samples has sometimes been found by the microbiology laboratory staff at our institution. Therefore, the purpose of this case series was to review patients in whom *S. pneumoniae* was isolated from their bile.

2. Patients and methods

The present single center retrospective case-series review included patients in whom *S. pneumoniae* was isolated from their bile at the Shizuoka Cancer Center Hospital between September 2002 and August 2015. This study design was approved by the hospital's ethics review board. Subjects consisted of all patients in whom *S. pneumoniae* was isolated from their bile during the study period. Bile specimens for culture were obtained from biliary drainage procedures such as endoscopic retrograde biliary drainage (ERBD), endoscopic nasobiliary drainage (ENBD), and percutaneous transhepatic biliary drainage (PTBD).

The definition of cholangitis was based on the Tokyo Guidelines 2013 diagnostic criteria (Table 1) [7]. To make a definitive diagnosis of cholangitis, one item from each of the three categories (A–C) was required. Furthermore, a suspected diagnosis could be made when

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Table 1
Diagnostic criteria for acute cholangitis.

A. Systemic inflammation
A-1. Fever and/or shaking chills
A-2. Laboratory data: evidence of inflammatory response

B. Cholestasis
B-1. Jaundice
B-2. Laboratory data: abnormal liver function tests

C. Imaging
C-1. Biliary dilatation
C-2. Evidence of the etiology on imaging (stricture, stone, stent, etc.)

Suspected diagnosis: one item in A + one item in either B or C
Definite diagnosis: one item in A, one item in B and one item in C

A-2 Abnormal white blood cell counts, increase of serum C-reactive protein levels, and other changes indicating inflammation
B-2 Increased serum ALP, r-GTP (GGT), AST, and ALT levels

Threshholds
A-1 Fever BT >38 ℃
A-2 Evidence of inflammatory response WBC (×1,000/lL) <4, or >10
CRP (mg/dL) ≧1
B-1 Jaundice T-Bil ≧2 (mg/dL)
B-2 Abnormal liver function tests ALP (IU) >1.5 × STD*
cGTP (IU) >1.5 × STD*
AST (IU) >1.5 × STD*
ALT (IU) >1.5 × STD*

Note: ALP; Alkaline phosphatase, r-GTP (GGT); r-glutamyltransferase, AST; aspartate aminotransferase, ALT; alanine aminotransferase
* STD upper limit of normal value

one item from the A list and one item from either the B or C list was present. In our study, we defined cholangitis as both definitive and suspected cholangitis. A diagnosis of cholangitis was made when the drainage was culture-positive for *S. pneumoniae*.

All the cultures used to evaluate the bile were analyzed by the Microbiology Laboratory at the Shizuoka Cancer Center. The Vitek 2 (bioMérieux, Marcy I'Etoile, France) and the MicroScan WalkAway (Siemens, Munich, Germany) instruments were used for automated bacterial identification and susceptibility testing. The Streptococcal Grouping Kit (Oxoid, Thermo Scientific, Waltham, MA), a rapid latex agglutination test, was used to identify streptococcal groups. *S. pneumoniae* was identified using the Optochin susceptibility test with a >13-mm zone of inhibition.

3. Results

Between September 2002 and August 2015, 20 patients had bile cultures positive for *S. pneumoniae* (Table 2). The median age of these patients was 66.7 years (range 41–79 years), and 65% were

Table 2
Characteristics of patients with *S. pneumoniae* in bile.

Variable	No. (%) of patients n = 20
Median age, years range	66.7 (41–79)
Male sex	13 (65)
Underlying condition	
Cholangiocarcinoma	15 (75)
Pancreatic cancer	3 (15)
Gallbladder cancer	1 (5)
Hepatocellular carcinoma	1 (5)
Drainage procedure[a]	19 (95)
Meantime to detection of *S. pneumoniae* – days range	26 (0–313)
Coexisting cholangitis	12 (60)
Clinical necessity of treatment of cholangitis	5 (42)
Steroid treatment[b]	0 (0)

[a] Endoscopic nasobiliary drainage, endoscopic retrograde biliary drainage, and percutaneous transhepatic biliary drainage.
[b] Steroid treatment; currently or past use of steroid treatment on medical record.

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