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Which imaging modalities should be used for biliary strictures of unknown aetiology?

Why is it so difficult to determine the nature of isolated biliary strictures? In patients with no history of biliary surgery, most bile duct strictures have to be considered malignant until proven otherwise. This usually leads to extensive usage of diagnostic imaging—in many cases even to explorative laparotomy. Furthermore, we usually have a “luxury problem”: doctors have to choose the appropriate imaging technique out of the wide range of endoscopic and radiological modalities. For this purpose, doctors should have information about each technique. In a multimodal approach, we prospectively analysed sensitivity and specificity for differentiation between malignant and benign strictures, penetration into surrounding tissues, vascular invasiveness and staging of lymph node.

We included patients with jaundice of unknown aetiology and suspected biliary stricture. According to the study protocol, patients underwent diagnostic laparotomy; alternatively, a long follow-up of more than 12 months was accepted. Patients were not included in case of metastases. We examined patients applying endoscopic retrograde cholangiopancreatography (ERCP), intraductal ultrasonography (IDUS), endoscopic ultrasound (EUS), multidetector CT (MDCT) and MRI.

In our study, a total of 30 patients were enrolled. According to the histopathological results following laparotomy, we found 21 (70%) patients with malignancies. For analysis of penetration into the surrounding tissue, vascular infiltration and lymph node invasiveness, we included only patients who underwent surgery as gold standard ($n=28$). ERCP and IDUS, EUS and MDCT proved to be significantly superior in differentiating benign from malignant strictures as compared with MRI (table 1). Penetration into the surrounding tissue was best shown by ERCP and IDUS, with a sensitivity of 88% (95% CI 64% to 99%), which was significantly better than MRI (24%, 95% CI 7% to 50%). With respect to vascular infiltration and lymph node invasiveness, we found only a slight difference in favour of MDCT compared with the other techniques.

In 2002, Rösch *et al.*¹ performed the first study with a multimodal approach. Since imaging modalities have clearly improved, there is a strong need for further prospective studies assessing different imaging methods adapted to the present state-of-the-art. According to our data, differentiation between malignant and benign strictures is most suitable by ERCP and IDUS. Compared with MRI, all three imaging techniques proved to be significantly superior in their ability to define potential malignancy of biliary strictures. Furthermore, ERCP supplemented by IDUS showed a high sensitivity rate—with a significant difference compared with MRI—in the assessment of tumour penetration into the surrounding tissue. With respect to vascular infiltration and lymph node invasiveness, no statistically significant difference was documented between the applied methods.

The development and improvement in MRI technology led to various assessments by

Table 1 Ability of diagnosing malignancy in biliary strictures of unknown aetiology

	Sensitivity (%)	p<0.05	Specificity (%)	p<0.05
ERCP and IDUS	95	0.02	89	NS
EUS	81	0.039	89	NS
MDCT	76	0.041	78	NS
MRI	48		78	NS

ERCP, endoscopic retrograde cholangiopancreatography; EUS, endoscopic ultrasound; IDUS, intraductal ultrasonography; MDCT, multidetector CT.

several study groups comparing MRCP with ERCP or with EUS.¹⁻⁵ The study group of Rösch stated that after an imaging technique has newly been introduced, scientific evaluations more typically achieve excellent results.¹ With wider use of the method, however, the initial enthusiasm decreases and less impressive accuracy rates are published.¹⁻⁶⁻⁸ This phenomenon could also be substantiated by the data of our study.

We are aware that the analysis performed in this study was not entirely fair since three cross-sectional techniques and one ductal imaging technique supplemented with a limited cross-sectional modality were compared. Furthermore, according to the study protocol, there has been a bias in our study: since some of the patients were referred to our hospital because of acute cholangitis, plastic prosthesis had to be placed immediately during ERCP, which made it difficult for the further applied diagnostic imaging modalities. Under ideal conditions, the diagnostic results might probably have been better for these techniques. However, our results may mirror adequately the clinical reality in most of the patients with biliary strictures of unknown aetiology.

According to our results, the combination of ERCP and IDUS seems to be the most precise imaging modality in diagnosing biliary strictures. For a more complete preoperative evaluation (eg, lymph node invasion), a further imaging modality such as EUS⁹ or MDCT should be added.

Acknowledgements

DD thanks Professor Gary L Powell for helpful and valuable suggestions regarding the manuscript and true friendship for over 20 years.

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doi: 10.1136/gut.2007.123315

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Competing interests: None.

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