

DETECTION OF CONGENITAL URETHRAL STRICTURE USING THREE-DIMENSIONAL IMAGE PROCESSED FROM THE ENDOSCOPIC VIDEO IMAGE

Hypothesis / aims of study

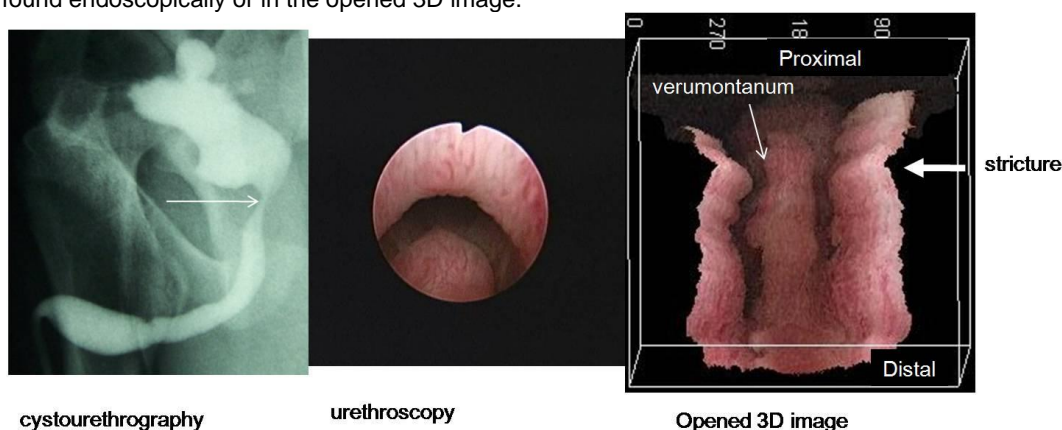
Congenital urethral stricture is diagnosed by cystourethrography and incised endoscopically, however, identification of the lesion is rather difficult endoscopically at surgery. In ICS2008, we presented a method to extract three-dimensional (3D) information of the urethra from endoscopic video image. Since alteration of shape of the urethral wall should occur under water pressure, detection of stricture site would be possible by extraction of 3D information of the urethra. Here, we applied novel method of processing endoscopic video image, and estimated its usefulness.

Study design, materials and methods

Between April 2007 and January 2008, four male children with nocturnal enuresis had scheduled to carry out endoscopic incision of urethral stricture diagnosed by voiding cystourethrography. Opened image of the whole urethra was created using cystourethroscopic video image during surgery by pulling out the endoscope slowly through the urethra under constant irrigation. The video image was captured into Windows PC, and processed to make opened 3D picture using software (Endoflatter, Chiba Univ., Chiba, Japan). The software is designed to calculate relative distance between the object and the endoscope by intensity of each pixel of the image. Findings of endoscopic image and the opened 3D picture were compared before and after incision.

Results

Opened 3D image was created successfully in every trial instantly. The opened 3D image clearly indicated the location of stricture around the verumontanum in one patient which was not confirmed in the endoscopic observation (figure) in one patient. Two patients had stricture just distal to the sphincter, and the opened 3D image showed similar power in detection of the lesion to the endoscopic image. However, Opened 3D image showed change of the channel after incision in them. In one patient, no lesion was found endoscopically or in the opened 3D image.



Interpretation of results

Urethral wall is exposed with water pressure by irrigation during endoscopic observation. Rapid extraction of 3D information under constant irrigation reveals difference in tonus of the urethral wall, resulting in enhancement of stricture site. This method offers new item to strengthen radiological findings in patients with urethral stricture during endoscopic management.

Concluding message

Opened 3D image adds novel function to conventional endoscopy to diagnose rigidity of the organs. It will serve identification of the lesion and evaluation of the efficacy of incision in patients with congenital urethral stricture.

Specify source of funding or grant	None
Is this a clinical trial?	Yes
Is this study registered in a public clinical trials registry?	No
What were the subjects in the study?	HUMAN
Was this study approved by an ethics committee?	Yes
Specify Name of Ethics Committee	Ethics Committee of Graduate School of Medicine, Chiba University
Was the Declaration of Helsinki followed?	Yes
Was informed consent obtained from the patients?	No