

## 3D PRINTING OF MINIPORTS FOR MICROLAPAROSCOPIC SURGERY USED IN NEWBORNS AND PREMATURE INFANTS

Salmai Turial; Konrad Sillman; Tony Winkler; Frank Meyer; Alexandra Nyiredi

Division of Pediatric Surgery, Pediatric Trauma Surgery and Pediatric Urology,  
University Medical Centre Magdeburg, Germany

### Conclusions

The production of miniports for microlaparoscopy using 3D-printing technologies is feasible. To obtain the optimum efficacy in terms of printing material, stability in very-small-diameter instruments and their technical practicality are subjects of further ongoing studies.

### Introduction

The industrial scale production of consumable medical supplies such as mini-instruments designated for minimally invasive pediatric surgery (MIS), explicitly for use in neonates and premature infants, has been constantly discontinued due to high manufacturing costs and very low demand, most probably.

The aim of our technical investigation was to create "miniports" of 1.4 mm in diameter using 3D-printing technologies.



### Material and methods

A technical pilot study was performed as a joint collaboration between the Department of Pediatric Surgery at the University Medical Centre and the Department of Manufacturing Technology with Focus Machining at the Otto-von-Guericke University of Magdeburg (Germany).

We evaluated the feasibility and effectiveness of 3D-printing technologies used for the production of mini-trocars and trocar valves, in particular, different 3D-printing techniques and 3D-print ingredients.



### Results

Four locally available 3D-printing techniques were explored and evaluated for usability. As a next step, three different printing materials ("White V5", "Surgical Guide", "Elastic 50A") were considered for prototype production.

In three prototype models, the gradual reduction of trocar diameter from 4 to 1.4 mm was attained. Two of three substances showed a high rate of material breakage and instability of the prototypes. The first two valve prototypes were not suitable for appropriate use. The next two valve generation obtain the functionality level as required. There were ten different trocar prototypes produced. Eight trocar prototypes were not suitable for clinical use, two trocars' function was properly.

## CONTACT INFORMATION

Salmai Turial, MD

Head of the Division of Pediatric Surgery, Pediatric Trauma Surgery  
and Pediatric Urology University Medical Centre Magdeburg, Germany

✉ [salmai.turial@med.ovgu.de](mailto:salmai.turial@med.ovgu.de)

☎ +49 391 67 15605

