Modular training in percutaneous nephrolithotripsy

Stepwise training and close mentoring offer benefits to endourological trainees

The second axis of the training structure is based on the objective evaluation of the candidates in the acquisition of skills as they progress. The lack of proper evaluation of the trainees could result in significant difficulty to correct any deficiencies. In an attempt to achieve an objective measurement of the progress of the trainees, an objective assessment tool (Global Rating Scale of PNL training) was adapted.

The modular training PNL scheme is divided into five modules. Initially, an animal lab course takes place for basic skill acquisition (Module 1). At this course, the participant learns and practices the basic puncturing, dilation and intrarenal orientation with the nephroscope. The remaining four modules are based on the sequence of the steps of PNL procedure and include the performance of punctures, tract dilation, single stone, and large stone management. When the trainees are qualified for the clinical training, they perform the punctures and advance to the first clinical module (Module 2).

The remaining steps of the procedure are performed by the mentor with the trainee as assistant. The trainees progress for the performance of the next level is based on the SBS which represent an objective evaluation of the trainees by the mentor. When the trainee advances to the next module, he/she performs all previous modules as well as the new module for each procedure. Eventually, the trainee performs all modules independently. After the successful completion of the modular training scheme, the trainee performs a series of PNL procedures independently.

Performance results

The evaluation of the above training programmes took place at our institution with the participation of a resident and a fellow in endourology. Some of the above-mentioned trainees already had previous experience in PNL and both had assisted in a number of PNL procedures. The results showed that each of the above-mentioned trained residents required no more than two pigs and 22 cases for the successful completion of the modular training. After the modular training, each trainee performed six procedures independently. These procedures were divided in segments of 15 cases in an attempt to determine the learning curve of the procedure. The mentor also performed 25 cases of PNL as a control series.

Operative and fluoroscopy times were initially longer for the trainees in comparison to the mentor. In the last 30 cases the trainee performed a plate in terms of operative and fluoroscopy time and they required similar time to the mentor (Fig. 2). During the performance of the 60 cases, the stone free rate, complication rate and drop of haemoglobin were similar among the trainees and the mentor. These results showed that the trainees are able to perform safe and efficient PNL procedures immediately after finishing the modular training programme. Further results showed that the improved operative efficiency was better than the mentor.

Some points are interesting for the design of the above-mentioned successful training programme. Module 1 is based on the live porcine model as the latter closely replicates the human kidney and simulates realistically the performance of PNL under both fluoroscopy and ultrasound guidance. In fact, it is considered to provide results that are similar to those obtained with human anatomy and, moreover, the “trauma feeling” is superior to any other biological model. The evaluation of the modular training scheme shows that Module 1 sufficiently prepares the trainees for the clinical segment of the modular training.

Basic skills

The basic cognitive skills could be acquired after using a very limited number of animal models. Moreover, our data show that the performance of trainees during the clinical module is associated with a low number of errors. The latter observation probably supports the aforementioned efficient skill acquisition. It should be noted that thementship allows the mastering of puncture, which is probably the most important step in the PNL technique as it is the basis for the success of the whole procedure. In addition, the clinical steps of the modular scheme provide clinical training on the technique with constant mentoring, and the smooth transition from the animal lab training to the independent clinical cases is possible.

In conclusion, the modular training scheme in PNL provides a basic skill acquisition course which is followed by a stepwise clinical training course under controlled conditions and mentoring. This scheme facilitates the faster advancement of trainees into levels of efficiency similar to that of their mentor during the independent experience acquisition. The modular training scheme could be considered by all instructors who are involved in endourological training since it is easily explained and highly reproducible due to the use of standardised methods.

References


Fig. 1: Continuous mentoring is very important for surgical training. The very percutaneous first endourology requires the development of skills which are not developed in conventional surgery and which also requires precise knowledge of technique, adequate material and equipment. Thus, the mentoring by an expert endourologist cannot be substituted by any other learning process. During the modular training the constant is always under the mentor’s supervision and guidance and every evaluation is based on objective parameters.

Fig. 2: Operative time in relation to the cases performed by the trainee and mentor. TI and T2 represent rates of the trainees. The operative time achieves a plateau for both trainees after the performance of 36 procedures.

EUV Section of Uro-Technology (EUUT)