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Commentary

Conventional Versus Therapeutic Stents for Airway Malignancies: Novel Local Therapies Underway

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Lung cancer is still diagnosed at a late stage, despite having new tools for diagnosis [1]. In inoperable stages, systematic therapy is applied according to the molecular profile of the patient. However, several of the newly diagnosed patients already have advanced disease and their central airways are sometimes obstructed by lung cancer. Therefore local treatment with endoscopical tools such as argon plasma, laser, cryo, and surgical debulking can be applied in order to open a central airway where this is feasible [2]. For the airway to maintain its architecture, a stent must be placed. The type of stent, its length and width is very important and it falls to the treating physician to choose correctly. Currently we are looking towards customized stents and techniques of application [3]. Parameters such as the response of the patient to treatment is very important. In cases where systematic treatment is not efficient, local therapy becomes essential and is feasible using drug-eluting stents. Drug-eluting stents were first designed by cardiologists several years ago [4]. Nowadays, with the evolution of 3D printers and drug-loading molecules, customized drug-eluting stents can be designed. One challenge is that granuloma tissue might form at the end of a stent as a result of physical stress. However, new forms of drug-eluting stents are being developed that include drugs that are able to inhibit granuloma tissue formation such as pirfenidone, as-well-as drugs that act as local chemotherapy [1,4]. Another major obstacle that needs to be overcome is the fact that drug concentration has a time limit and therefore we have to combine different drugs with different mediators to sustain its release [2,5]. Furthermore, developing a technique were stents can be taken out easily and replaced is required to sustain the effect of local therapy. Several groups have developed drug-eluting airway stents either as chemotherapy (targeted therapy with tyrosine kinase inhibitors), non-specific lung cancer chemotherapy (cisplatin/paclitaxel), radioactive stents, corticosteroids, sirolimus, mitomycin C and antibiotics [2]. Moreover, novel bioabsorbable stents have been manufactured with a sustained drug-release system [2]. Paclitaxel-loaded stents with a sustained release effect were developed and tested in vitro and in vivo [2,6]. Cisplatin-loaded stents have also been developed with a sustain release effect and tested in vitro and in vivo [2,7].

Stents are usually used as a palliative care intervention for lung cancer patients. In a clinical study performed by our group, the insertion of an airway stent was proven to be beneficial and improved the quality of life in those patients where systematic therapy was not efficient [8]. Stent placement should be performed in centers of interventional pulmonary excellence. One could say that inserting a stent is the easiest part; taking out a stent is the most difficult part and of course handling the adverse effects is also necessary. In most cases, an interventional procedure precedes stent application because an endobronchial or endotracheal mass exists. Surgical debulking is performed under general anesthesia using several tools and techniques including laser (YAG), argon plasma, and electrocautery for debulking [9].

We envisage that in the next five years custom-made stents will be available, differing from the standard stents and specific methods of stent deployment currently used. Moreover, we would like to have drug-eluting stents that have a sustained release effect. This can be done with 3D printers that not only design custom-made stents with the help of CT scans of the thorax, but also with the addition of polymers to modify drug release [10]. A major issue for custom-made stents is the method of application, and specialized insertion techniques might be necessary.

Disclosure

The authors declare no conflicts of interest.

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