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*Endoscopic procedures in the palliative treatment of esophageal cancer with particular consideration of self-expandable stents*

In Poland, 1,222 new esophageal cancer cases were registered in 2000 (978 males and 258 females) (4). Esophageal carcinoma presents one of the worst survival rates and is one of the most resistant to the treatment among alimentary tract carcinomas. Dysphagia (difficulty in swallowing) is a complaint which is reported by the majority of the patients. In 87%–96% of the patients it is first but also the late symptom of the disease (5).

Esophagectomy remains the principle method of the treatment of esophageal cancer. Unfortunately, only a small number of the patients (approximately 50%) with advanced esophageal cancer can undergo surgical treatment (6). A poor general condition and delayed diagnosis are the main reasons of this situation. Therefore, a palliative treatment improving esophageal passage remains the main method of management in the majority of esophageal cancer patients. An improvement in swallowing can be achieved by mechanical dilation, cancer tissue ablation using bipolar coagulation, argon plasma coagulation, laser beam, cryotherapy, chemotherapy, radiotherapy (tele- or brachytherapy) or by esophageal stenting (6, 8, 11, 12, 15).

In the light of the available clinical investigation, considering the duration of improved swallowing and quality of life, esophageal stenting appears to be the most efficient palliative procedure (2, 16). The first successful implantation of self-expandable stent was carried out in 1990 (1). Latex- or silicon-made stents enforced with stainless wire have been in use for 20 years.

The aim of the present study was a retrospective analysis and evaluation of different methods of esophageal passage restoration based upon our latest experiences in a palliative treatment of patients with inoperable squamous cell carcinoma of the esophagus.

MATERIAL AND METHODS

Eighty-seven patients with esophageal cancer were treated at Second Department of General Surgery, Skubiszewski Medical University of Lublin between 2001 and the end of June 2004. Sixty-three patients were referred to palliative treatment due to a poor general condition or irresectable tumor (59 M & 4 F, mean age 65, range 45–85) (Tab. 1). All the patients complained of III or IV grade dysphagia (I grade – difficulty in solid food swallowing, II grade – difficulty in semi-solid or soft food swallowing, III grade – difficulty in fluids swallowing and IV grade – aphagia – inability of swallowing). The principle objective of the treatment was the improvement of swallowing by restoration of the esophageal passage and the improvement of quality of life. Mechanical dilation with balloons or

KeyMed dilators was performed in 30 patients, ablation with bipolar coagulation in 11 patients and implantation of self-expandable stents in 22 patients.

Table 1. Gender, age and staging of the patients with esophageal cancer undergoing a palliative treatment

Mean age	65 years
Age range	45–85 years
Gender	
M	59
F	4
Staging according to the TNM classification	
II	17
III	28
IV	18

## RESULTS

All the patients who underwent the palliative endoscopic procedures complained of a pain of different intensity. Bleeding, which occurred in some patients, was self-limiting and it stopped spontaneously within 2 days after a procedure. Chest pain or discomfort persisted longer after stent implantation. In patients with symptoms of mediastinal origin X-ray examination was carried out to rule out esophageal perforation.

In patients with III and IV grade dysphagia 1-grade improvement occurred within 24-hours after application of mechanical or ablative techniques and 1- or 2-grade improvement enabling solid food intake occurred after self-expandable stent implantation. Mechanical and ablative techniques were performed two or three times within single hospitalization. Basically, esophageal stenting was preceded with initial mechanical or ablative procedure. Readmission within 2 to 16 weeks (mean 8 weeks) with repeated esophageal passage restoration procedures was necessary in 12 patients who underwent palliative treatment other than stenting. Seven patients were readmitted to the hospital three times due to recurrent dysphagia. The mean hospital stay after stent implantation was 5 days and after other palliative procedures 9 days. Restenosis resulting from malignant overgrowth above or below the stent occurred in 5 patients. Readmission due to restenosis resulting from malignant overgrowth above or below the stent was necessary in 3 patients and three-time hospitalization in 2 patients. Ablation with argon plasma beamer was used to restore esophageal passage in these patients.

A rupture of the esophageal wall was observed in 1 patient during mechanical dilation using KeyMed set. A conservative treatment was sufficient. In-hospital death occurred in 2 patients undergoing mechanical dilation and in 1 patient who underwent stenting. The cause of death was severe cardiac and respiratory failure without evident radiological signs of injury of the esophageal wall. The mean survival time of the patients after stenting was 135 days and since the first palliative procedure it was 296 days. The survival of the patients who underwent palliative treatment according to cancer staging is shown in figure 1. Two of 27 patients (1 after stenting), who underwent palliative treatment in 2002, 6 of 25 patients (1 after stenting) who underwent palliative treatment in 2003 and 5 of 11 patients (2 after stenting) treated with palliative procedures within the first six months of 2004 are still alive.

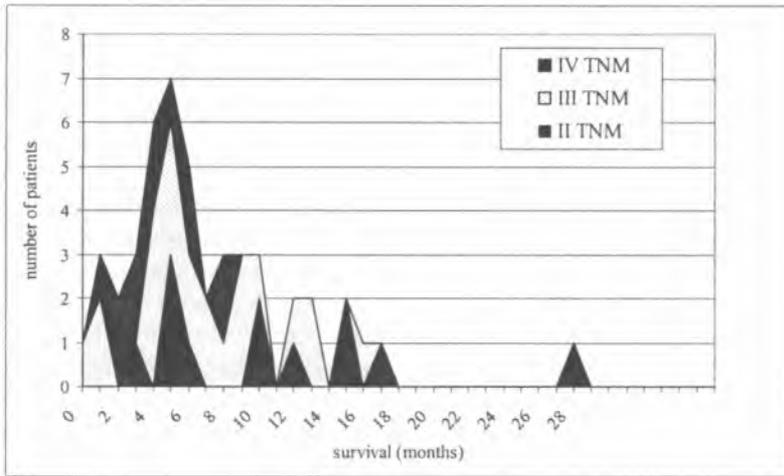


Fig. 1. A survival time of the patients undergoing a palliative treatment

## DISCUSSION

The ability to swallow and food intake significantly influences the nutritional status and thus the quality of life and survival of the patients with inoperable esophageal carcinoma. Endoscopic treatment is the key element of palliative care because at the time of a diagnosis less than 50% of the patients are fitted to surgical treatment (6, 8).

To achieve an optimal quality of life of the patients the least invasive methods of treatment featuring with the least mortality rate, the least number of repeated interventional sessions and with the longest duration of the improved swallowing should be applied. Currently, a variety of esophageal passage restoration techniques have been in practice: mechanical dilation with balloons or plastic dilators, ablation with bipolar coagulation, argon plasma coagulation, laser beam, photodynamic therapy, injection techniques or esophageal stenting with rigid or self-expandable stents, chemotherapy or chemoradiotherapy (6, 12, 15). Decision making about the selection of the method of treatment should be based upon wide knowledge concerning available therapeutic methods and personal experience of an endoscopist or surgeon. Moreover, the availability of a particular method in an institution undertaking the treatment should be considered.

Currently available reports indicate an unfavorable outcome of the treatment of dysphagia with radiotherapy as a single method. A high dose radiation is associated with severe, frequently life-threatening complications. Moreover, an improvement in swallowing occurs one or two months after the onset of radiation (15). Hyperfractionated radiotherapy appeared to be a more efficient mode of management as in the majority of the patients after its application one can achieve an improvement in swallowing lasting several months (13). So far clinical experience shows a mere benefit of endoluminal brachytherapy. It can be applied in patients in whom insertion of the applicator is possible. Brachytherapy is associated with numerous endoscopic procedures and an improvement in swallowing can be noticed a long time after the application of the method. A short duration of the beneficial effect of the treatment and life-threatening complications (perforation, fibrosis) make this method less effective and of increased risk (10, 15).

Endoscopic restoration of the esophageal passage (mechanical dilation, ablation with bipolar coagulation, argon plasma coagulation, laser beam) provides an immediate improvement in swallowing;

however, its duration is relatively short (weeks) and thus it can be applied in selected patients (short stricture, the lack of the fistula, endoluminal infiltration). A prolonged beneficial effect can be obtained after a photosensitiser administration and subsequent application of an appropriate wavelength laser light for induction of photosensitising reaction resulting in the death of cancer cells. However, this therapeutic method is cost-consuming and the patient has to avoid exposition to the sunlight for six months (10, 12).

Encouraging results of chemoradiotherapy in improving swallowing have been published lately (7). Nevertheless, this method of palliative treatment has its own limitations. Frequent complications, including those life-threatening, required a good general condition of the patient (normal kidney and circulatory function), age below 70 and incomplete dysphagia are significant limitations of a number of patients in whom chemoradiotherapy can be applied.

In the light of the up-to-date clinical experience esophageal stenting seems to be the most optimal method of an improvement in swallowing in the treatment of malignant esophageal strictures (5, 8, 15). Silicon- or latex-made stents are inserted to the esophagus by rigid or semi-rigid introductory set. Although these stents enable semi-solid food intake to the majority of the patients and even a normal diet intake to some of them their implantation can be associated with esophageal perforation or patient's death in 10% and 6% of the cases, respectively (3, 14). A stent migration or obstruction by overgrowing cancer tissue can also occur (14). The advantage of self-expandable metal stents over plastic ones results from easier implantation technique due to a thinner introductory device and unnecessary dilation before stenting. Additionally, a bigger stent diameter after its maximal expansion in the association with pronounced flexibility compared to rigid stents facilitates restoration of normal swallowing in the majority of the patients and decreases a complication rate. An overgrowth of cancer tissue in-between metal wires of the stent wall, stent migration, difficult correction of stent position and the high cost which in part can be compensated for by a shorter hospital stay are regarded as the main disadvantages of these stents (9). At our department we used Ultraflex self-expandable stents (Boston Scientific Ltd) made of nitinol wire net featuring with a high flexibility and relatively low expansion power. These stents were implanted in 22 patients with no procedure-related deadly complication. The duration of hospital stay in the patients after stenting was 4 days shorter compared to the patients after other endoscopic palliative procedures. The patients after stenting had longer persisting chest pain than the patients after mechanical dilation or ablation by BICAP. Restenosis resulting from malignant overgrowth above or below the stent occurred in 5 patients. Ablation with argon plasma beamer was used to restore esophageal passage in these patients.

Our experience indicates that the endoscopic implantation of self-expandable stents is a highly effective procedure in the palliative treatment of malignant esophageal strictures and it minimizes the discomfort associated with multiple hospitalizations related to other palliative techniques. Our results are in accordance with those reported by others (1, 2, 3, 8, 9, 11).

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#### SUMMARY

Only a small number (less than 50%) of esophageal cancer patients is fitted for surgical treatment. Therefore, palliative treatment improving swallowing remains the principle mode of the management in the majority of patients. We present our own experiences in the application of different methods of passage restoration of malignant esophageal strictures in 61 patients with inoperable squamous cell carcinoma undergoing a palliative treatment between 2001 and 2004. Mechanical dilation procedures with balloons or KeyMed dilators were carried out in 30 patients, ablation with bipolar coagulation applicator (BICAP) in 11 patients and implantation of self-expandable stents in the remaining 22 patients. Mechanical and ablative techniques were performed 2 or 3 times within single hospitalization. The mean hospital stay after stent implantation was 5 days and after other palliative procedures 9 days. Readmission due to restenosis resulting from malignant overgrowth above or below the stent was necessary in 3 patients and three-time hospitalization in 2 patients. Chest pain or discomfort persisted longer after stent implantation. In patients with III and IV grade dysphagia 1-grade improvement occurred within 24-hours after application of mechanical or ablative techniques and 1- or 2-grade improvement enabling solid food intake occurred after self-expandable stent implantation. Readmission

within 2 to 16 weeks (mean 8 weeks) with repeated esophageal passage restoration procedures was necessary in 12 patients who underwent a palliative treatment other than stenting. A rupture of the esophageal wall was observed in 1 patient during mechanical dilation using KeyMed set. A conservative treatment was sufficient. In-hospital death occurred in 2 patients undergoing mechanical dilation and in 1 patient who underwent stenting. The cause of death was severe cardiac and respiratory failure without evident radiological signs of injury of the esophageal wall. The mean survival time of the patients after stenting was 135 days and since the first palliative procedure it was 296 days. Two of 27 patients (1 after stenting) who underwent a palliative treatment in 2002, 6 of 25 patients (1 after stenting) who underwent a palliative treatment in 2003 and five of 11 patients (2 after stenting) treated with palliative procedures within the first six months of 2004 are still alive. Our experience indicates that the endoscopic implantation of self-expandable stents is a highly effective procedure in the palliative treatment of malignant esophageal strictures and it minimizes a discomfort associated with multiple hospitalizations related to other palliative techniques.

#### Endoskopowe zabiegi w leczeniu paliatywnym raka przełyku ze szczególnym uwzględnieniem protez samorozprężalnych

Leczenie operacyjne chorych z rakiem przełyku jest możliwe tylko u niewielkiej liczby chorych (około 50%). Zatem leczenie paliatywne, poprawiające drożność przełyku, jest zasadniczym sposobem postępowania u większości chorych. W obecnej pracy przedstawiamy własne doświadczenia w stosowaniu różnych metod udrażniania nowotworowych zwężeń przełyku u 61 chorych z nieoperacyjnym rakiem, leczonych paliatywnie w latach 2001–2004. U 30 chorych wykonywano zabiegi rozszerzania mechanicznego za pomocą balona lub zestawu rozszerzadeł KeyMed, u 11 chorych zastosowano metodę koagulacji bipolarnej, a u 22 pacjentów założono protezy samorozprężalne. Zabiegi udrażniania mechanicznego przełyku wykonywano dwu- lub trzykrotnie w trakcie jednej hospitalizacji. Ból lub dyskomfort w klatce piersiowej utrzymywał się dłużej w przypadku założenia stentu przełykowego. Pacjenci z dysfagią w stopniu III i IV w ciągu 24 godzin po zabiegu rozszerzania mechanicznego lub ablacji za pomocą koagulacji bipolarnej odczuwali poprawę o jeden stopień, zaś po założeniu stentu samorozprężalnego o jeden lub dwa stopnie, czyli uzyskiwali możliwość przyjmowania stałych pokarmów. Odnotowano jeden przypadek pęknięcia przełyku w trakcie mechanicznego rozszerzania zwężenia nowotworowego za pomocą zestawu KeyMed. Chorego leczono zachowawczo. Trzech chorych poddanych zabiegom paliatywnym udrożnienia przełyku zmarło w czasie hospitalizacji. Przyczyną zgonu była ostra niewydolność oddechowo-krażeniowa przy braku radiologicznych wykładników uszkodzenia przełyku u dwu pacjentów rozszerzanych mechanicznie oraz u jednego chorego po założeniu protezy samorozprężalnej. Pacjent po założeniu stentu przebywał w oddziale średnio 5 dni, a po zabiegach innego typu 9 dni. Ponowna hospitalizacja w ciągu 2–16 tygodni (śr. 8 tyg.) z ponownymi zabiegami udrażniania przełyku konieczna była u 12 chorych poddanych zabiegom paliatywnym innym niż protezowanie. Powtórna hospitalizacja z powodu restenozy spowodowanej przerośnięciem guza powyżej lub poniżej protezy konieczna była u trzech, a trzykrotny pobyt w szpitalu u dwu pacjentów. Średnia długość przeżycia chorych po założeniu stentu samorozprężalnego wynosiła 135 dni, a od chwili wykonania pierwszego zabiegu paliatywnego 296 dni. Wśród chorych leczonych w 2002 roku żyje 2 z 27 (w tym jeden ze stentem) chorych leczonych paliatywnie, wśród chorych leczonych w 2003 roku żyje 6 z 25 pacjentów (w tym jeden ze stentem), a wśród chorych leczonych paliatywnie w ciągu pierwszych sześciu miesięcy 2004 roku żyje 5 z 11 pacjentów (w tym dwu ze stentem). Z naszych obserwacji wynika, iż w leczeniu paliatywnym nowotworowych zwężeń przełyku najbardziej skuteczną i najmniej obciążającą metodą jest endoskopowe zakładanie stentów samorozprężalnych.