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Effect of Laser Vocal Cord Surgery under Laryngeal Microscope Combined with Nano-silver Dressing Antibacterial Nursing on Efficacy and Quality of Life of Patients with Laryngeal Cancer

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ABSTRACT

To explore the adoption effect of nano-silver medical antibacterial dressing in the perioperative treatment of patients with laryngeal cancer, 120 patients with early laryngeal cancer were selected as the research objects. According to the different treatments, they were averagely divided into the test group (laser vocal cord surgery under a laryngeal microscope and nano-silver medical antibacterial dressing) and the control group (laser vocal cord surgery under a laryngeal microscope and sterilized vaseline gauze). The results showed that there were considerable differences in dressing-change times, dressing-change cost, hospital stay, and recovery time between both groups (P<0.05). The number of mild pain cases in the test group was more than that in the control group at 1, 3, and 5 days after surgery, with statistically considerable differences (P<0.05). There were substantial differences in wound area between the two groups at 3 and 5 days after surgery, and the test group was larger than the control group (P<0.05). In the test group, 0 patients had postoperative reinfection, wound dehiscence, and wound hernia. In the control group, 3 patients had postoperative reinfection, 1 had wound dehiscence, and 1 had wound hernia. In summary, compared with traditional sterilized vaseline gauze, the nano-silver medical antibacterial dressing could reduce postoperative dressing pain and promote the recovery of wounds, thus shortening the hospital stay and improving the quality of life of patients after surgery.

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Introduction

Laryngeal cancer is a relatively common tumor disease of the ear, nose, and throat. Its main clinical manifestations are hoarseness, dysphagia, sore throat, and difficult cough, and its incidence rate ranks third (1-4). Currently, the etiology of laryngeal cancer isn't clear, but it is possibly related to smoking, air pollution, drinking, endocrine disorders, etc. (5, 6). At present, the treatment of laryngeal cancer mainly includes surgery, radiotherapy, chemotherapy, and laser therapy. In addition to tumor resection, surgery can also ensure the normal function of the patient's throat as much as possible. Radiotherapy and chemotherapy are applied for early laryngeal cancer or in combination with surgery. For early primary cancer or laryngeal cancer without cervical lymph node metastasis at the T2 stage, laser therapy can be performed (7, 8).

Due to the small hole in the deep throat, complex structure, and hidden onset, the early diagnosis of this disease mainly depends on the clinical manifestations of the patient, and the treatment is majorly the symptomatic treatment, which is easy to delay into the chronic disease and even develop into the malignant disease. Traditional surgery has great limitations in the field of vision for treatment. Sometimes an external incision is required, which can leave a scar after surgery that affects the appearance. These disadvantages can lead to the loss of the best opportunity for treatment, thus leaving lifelong pain and regrets for patients and their families. In recent years, with the pervasiveness of medical high-

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definition (HD) microscope, the therapy of laryngoscope-guided surgery has developed well (9). The equipment of laryngeal micro-minimally invasive surgery mainly includes the supported laryngoscope, surgery microscope, laryngeal microsurgical instruments and its supporting laser, radiofrequency, and laryngeal dynamic minimally invasive system, with advantages of the clear surgical field, less bleeding, high resection accuracy, and less trauma (10-12). There are no complications in the treatment of laryngeal microsurgery. Nevertheless, there are possibly voice disorders in a short time after surgery, which is normal (13-15).

There is usually an open wound after the laryngeal cancer surgery. The incision wound needs to be drained unobstructed to promote wound healing as soon as possible. Consequently, a reasonable dressing change after surgery is very important (16). The traditional way to the dressing change is using vaseline gauze. Although gauze can resist the invasion of pathogenic bacteria, thereby reducing the possibility of infection, the extraction of gauze strips during dressing change can cause pain to patients, and the bleeding of wound surface also makes patients fear and uneasy about dressing change, thus resulting in giving up the on-time dressing change (17, 18). The nano-silver medical antibacterial dressing is a new antibacterial dressing. With contact with the wound, it can quickly and effectively kill pathogenic bacteria around the wound by releasing silver nanoparticles so that the infection can be controlled as well as relieve pain and inflammation to promote wound healing (19, 20).

To sum up, for surgery, postoperative wound rehabilitation is an issue that needs to be paid attention to. Wound healing has a great effect on the prognosis and quality of life of patients. Therefore, 120 patients with early laryngeal cancer admitted to the hospital from May 10, 2020, to February 10, 2022, were selected as the research objects. According to the different treatments, they were averagely divided into the test group (laser vocal cord surgery under a laryngeal microscope and nano-silver medical antibacterial dressing) and the control group (laser vocal cord surgery under a laryngeal microscope and sterilized vaseline gauze). The postoperative evaluation indexes of dressing change, the wound pain degree, and the wound-healing time were compared between the two groups to explore the effective means of assisting wound recovery after laryngeal cancer surgery.

Materials and methods

Research objects

120 patients with early laryngeal cancer treated in Xiangyang Central Hospital from May 10, 2020, to February 10, 2022, were enrolled. There were 65 males and 55 females, whose ages ranged from 25 to 70 years old. According to different treatment methods, they were divided into the test group and the control group. Patients in the test group were treated with laser vocal cord surgery under a laryngoscope microscope combined with nano-silver medical antibacterial dressing. The control group was treated with laser vocal cord surgery under a laryngoscope microscope combined with sterilized vaseline gauze.

The medical ethics committee of Xiangyang Central Hospital approved this experiment. All the patients volunteered to participate in the experiment and signed the informed consent before the implementation.

The inclusion criteria were as follows. I. Patients with the pathological diagnosis of early laryngeal cancer; II. Patients with complete clinical data; III. Patients whose wound occurred within 1 week after surgery; IV. Patients who cooperated with follow-up examination.

The exclusion criteria were as follows. I. Patients with active wound bleeding; II. Patients who used anticoagulants; III. Patients with a cancerous ulcer wound; IV. Patients with poor treatment compliance.

Treatment methods

For the surgery methods, the patient was placed in the supine position. After successful anesthesia, endotracheal intubation was performed. Then, the root of the tongue and epiglottis was lifted through the laryngoscope, and 1% decaine was for anesthesia. Leica microscope (Beijing Rico Medium Instrument Technology Co., Ltd.) was set up, a CO_2 laser machine was connected, and focal length and spot diameter were adjusted. Finally, the pathological tissue was removed. If the cancer tissue was large, it was necessary to remove part of it with laryngeal forceps first and then with the laser treatment.

Besides, enough safe margins (5mm outside the tumor tissue) during treatment needed to be ensured.

For the postoperative dressing-change methods, the control group was treated with the 12×15cm sterilized vaseline gauze. The gauze was filled on the wound, and the end of the gauze was placed outside the wound that was convenient for drainage, with a cotton pad on the outside, which needed to be replaced once a day. In the test group, the 12×15cm nano-silver medical antibacterial dressing (Shenzhen Aijiete Medical Technology Co., Ltd.) gauze was used. The gauze was filled on the wound, and the end of the gauze was placed outside the wound that was convenient for drainage, with a cotton pad on the outside, which was replaced once a day. Dressing change was performed by two nurses, and the wound was recorded by the camera.

For the post-treatment of the wound, calcium alginate dressing could be used for dressing change when there was no rotting flesh in the wound and the growth of granulation was good in both groups. If the wound leakage became decreased, the self-adhesive tape could be used to bond the wound until it was healed.

Observation indexes

The mean age, the case number of male and female, eye type (left eye, right eye), and the number of ischemic or non-ischemic cases were recorded. The visual analog scale (VAS) was adopted to evaluate the wound pain degree of patients after surgery (1, 3, and 5 days), which was classified into painlessness (0 points), mild pain (1-3 points), moderate pain (4-6 points), and serious pain (7-10 points). The wound area of patients after surgery (0, 1, 3, and 5 days) was measured. Wound healing time, dressing change times, dressing change costs, and length of hospital stay were recorded. Postoperative adverse events (reinfection, wound dehiscence, and wound hernia) were recorded during the 3-month follow-up visit.

Statistical methods

SPSS 19.0 was employed for data statistics and analysis. Mean ± standard deviation ($\overline{x}\pm s$) was how measurement data were expressed, and percentage (%) was how count data were expressed. One-way analysis of variance was used for the pairwise comparison of each index. The difference was statistically considerable with $P<0.05$.

Results and discussion

Comparison of general data between both groups

There were no statistically considerable differences in the case number of males and females, mean age, body mass index (BMI), the case number of hypertension, diabetes, hyperlipidemia, and smokers between the two groups ($P>0.05$) (Figure 1).

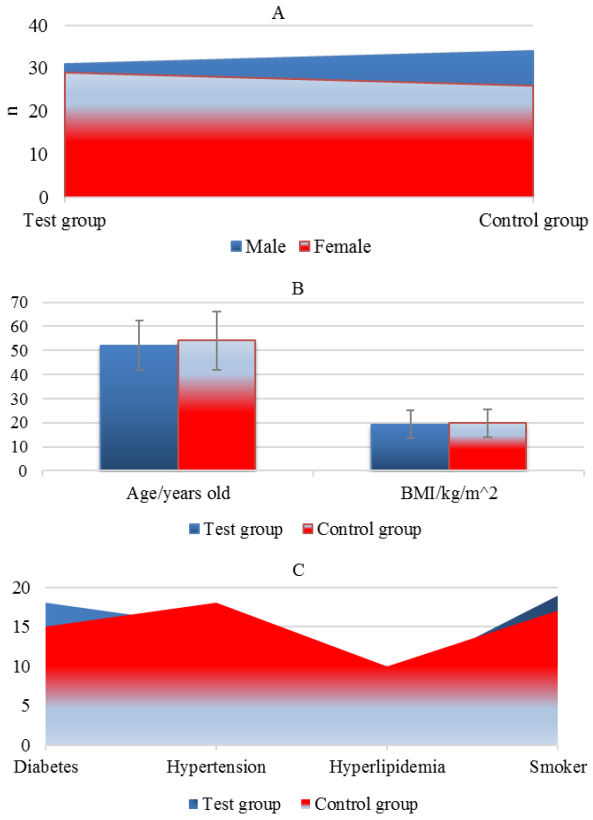

Figure 1. Comparison of general data between both groups. (A: the case number of male and female; B: mean age; C: the case number of hypertension, diabetes, hyperlipidemia, and smokers).

Case analysis of laryngeal cancer

Figure 2 showed the computed monography (CT) scanning image of the larynx of a 58-year-old man. This patient suffered from throat pain and hoarseness for more than 4 months before he saw a doctor, with the pressing pain and discomfort in left thyroid cartilage and hyoid bone and without a history of hypertension and tuberculosis. In Figure 2, the left larynx was occupied, with uneven density and unclear boundary. The laryngeal chamber was deformed. The left thyroid cartilage and hyoid bone were damaged.

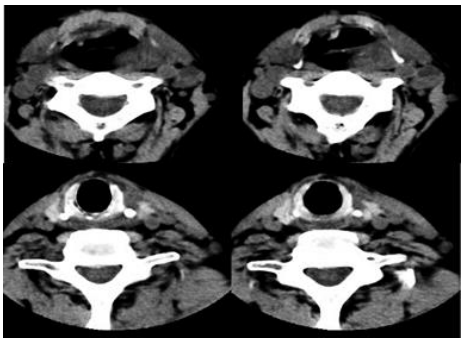

Figure 2. Plain CT scanning image of the larynx. (Male, 58 years old).

Figure 3 showed the plain CT scanning image of the larynx of a 60-year-old female patient. This patient was admitted to the hospital with recurrent hoarseness for more than 6 months. Through the physical examination, there was hyperemia of the laryngeal mucosa, swelling of the epiglottis, poor upward lift, and poor visibility of the laryngeal chamber and vocal cords. In Figure 3, the diffuse soft tissue thickened on the right side wall of the larynx, the larynx narrowed, and multiple lymph nodes on both sides of the neck enlarged.

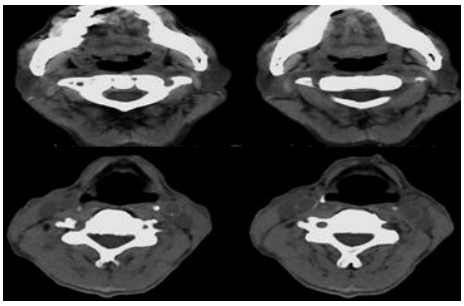

Figure 3. Plain CT scanning image of the larynx. (Female, 60 years old).

Evaluation indexes of dressing change in two groups

Figure 4 showed that in the test group, the frequency of dressing change was 7.08±1.55 times, the dressing-change cost was 593.53±40.67 yuan, the hospital stay was 8.86±1.16 days, and the recovery time was 31.47±5.68 days. In the control group, the frequency of dressing change was 18.44±2.86 times, the dressing-change cost was 976.28±39.82 yuan, the hospital stay was 19.04±3.05 days, and the recovery time was 46.03±5.81 days. The frequency of dressing change, dressing-change cost, hospital stay, and recovery time in the test group were all signally less than those in the control group, with statistically considerable differences (P<0.05).

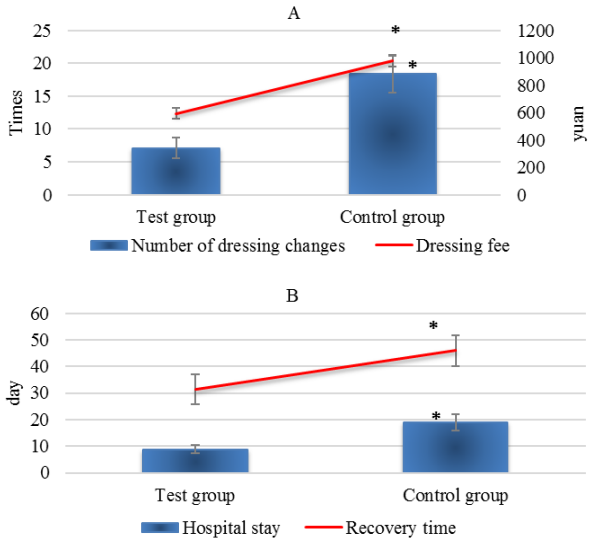

Figure 4. Evaluation indexes of dressing change in two groups. (A: the frequency of dressing change and dressing-change cost; B: hospital stay and recovery time). Note: * meant that compared with the test group, P<0.05.

Comparison of postoperative wound pain degree between the two groups

The number of patients with mild pain in the test group at 1, 3, and 5 days after surgery was remarkably higher in contrast to the control group, and the difference was statistically considerable (P<0.05). The number of patients in the test group with moderate pain and serious pain at 1, 3, and 5 days after surgery was observably less than compared with the control group, with a statistically considerable difference (P<0.05) (Figure 5).

Comparison of postoperative wound area between the two groups

In the test group, the wound area of patients on 1 day after surgery was 2.95±0.75cm^2, that on 3 days after surgery was 1.53±0.55cm^2, and that on 5 days after surgery was 0.91±0.24cm^2. In the control group, the wound area of patients on 1 day after surgery was 2.98±0.68cm^2, that on 3 days after surgery was 2.48±0.52cm^2, and that on 5 days after surgery was 1.25±0.33cm^2 (Figure 6). The differences in the wound area between both groups were statistically insignificant on 1 day after surgery (P>0.05). The wound area of the test group at 3 and 5 days after surgery was greatly lower than that of the control

group, and the difference was statistically considerable (P<0.05).

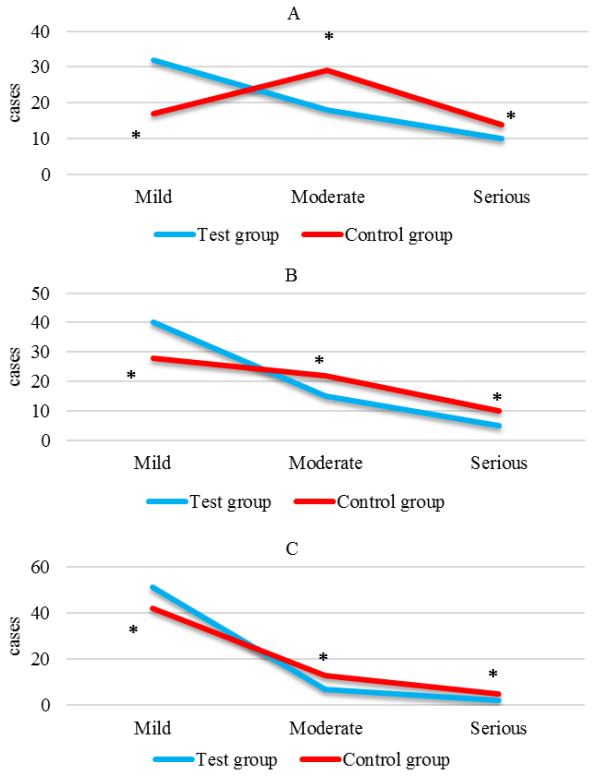

Figure 5. Comparison of postoperative wound pain degree between both groups. (A-C: the pain degree at 1, 3, and 5 days after surgery). Note: * meant that compared with the test group, P<0.05.

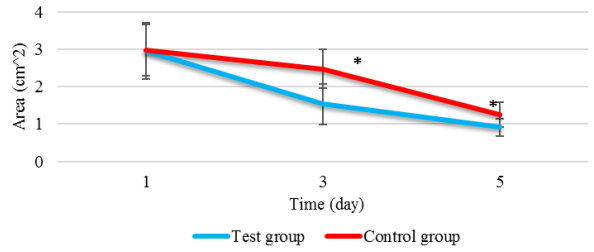

Figure 6. Comparison of postoperative wound area between the two groups. Note: * meant that compared with the test group, P<0.05.

Comparison of postoperative wound healing time and exudate maintenance time between the two groups

In the test group, the postoperative wound healing time and the exudate maintenance time were 25.82±3.72 days and 15.58±4.01 days, respectively. In the control group, the postoperative wound healing time and the exudate maintenance time were 32.66±4.69 days and 20.76±3.72 days, respectively (Figure 7). The postoperative wound healing time and dialysis maintenance time in the test group were significantly lower in contrast to the control group, with statistically considerable differences (P<0.05).

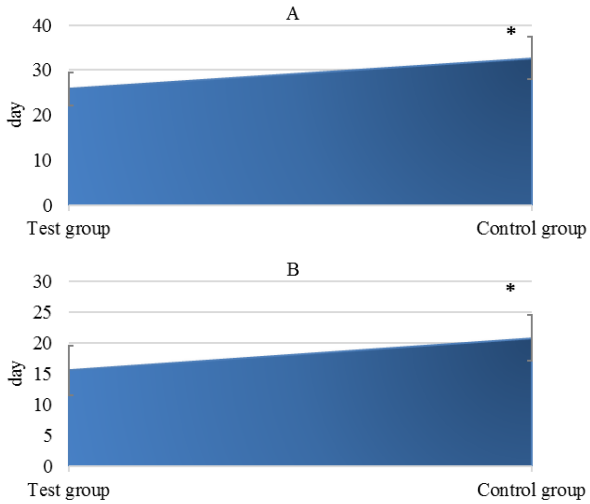

Figure 7. Comparison of postoperative wound healing time and exudate maintenance time between the two groups. Note: * meant that compared with the test group, P<0.05.

Comparison of postoperative adverse events between the two groups

Figure 8 showed that there were 0 patients with postoperative reinfection, wound dehiscence, and wound herniain the test group. In the control group, there were 3 cases of postoperative reinfection, 1 of wound dehiscence, and 1 of wound hernia. The number of cases with postoperative reinfection, wound dehiscence, and wound hernia in the test group was obviously lower than that in the control group, and the difference was statistically considerable (P<0.05).

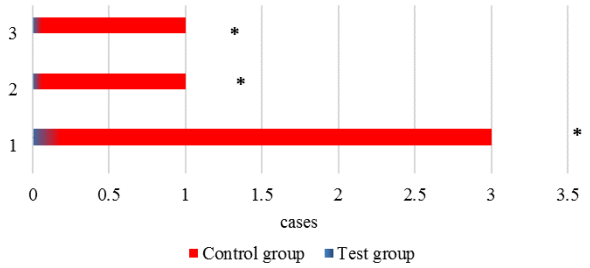

Figure 8. Comparison of postoperative adverse events between the two groups. Note: * meant that compared with the test group, P<0.05.

Traditional surgery treatment for laryngeal cancer has the disadvantages of a large resection area and a high degree of surgery trauma, which can easily lead

to the unguaranteed quality of life of patients after surgery (21). Presently, with the development of the supported laryngoscope, laser vocal cord surgery under a laryngoscope microscope has been widely applied in clinical treatment. Nonetheless, for surgical surgery, postoperative wound healing is also a vital step in the whole treatment process. In general, the major factor that causes difficult wound healing is the colonization of a large number of pathogenic bacteria, so it is necessary to select an appropriate method of the wound dressing to resist the infection of pathogenic bacteria (22, 23). Hence, 120 patients with early laryngeal cancer treated in the hospital from May 10, 2020, to February 10, 2022, were selected as the research objects. According to different treatment methods, they were classified into the test group and the control group. Patients in the test group were treated with laser vocal cord surgery under a laryngoscope microscope combined with nano-silver medical antibacterial dressing. The control group was treated with laser vocal cord surgery under a laryngoscope microscope combined with sterilized vaseline gauze. It aimed to explore the effective means of auxiliary wound recovery after laryngeal cancer surgery. According to the comparison of general data between both groups, there were statistically insignificant differences in the number of male and female patients, mean age, BMI, the case number of hypertension, diabetes, hyperlipidemia, and smokers between the test group and the control group (P>0.05), which provided the feasibility for subsequent studies.

The evaluation indexes of dressing change in the two groups were compared, and the results showed that the frequency of dressing change, the dressing change cost, length of hospital stay, and recovery time of patients in the test group were greatly less than those in the control group, with statistically considerable differences (P<0.05). It was similar to what Puxeddu et al. (2000) (24) found. It indicated that the nano-silver medical antibacterial dressing could effectively reduce the frequency of dressing changes after surgery, promote the recovery of patients' wounds, shorten hospital stay, and reduce the economic burden on patients and their families. In terms of pain degree, the number of patients in the test group with mild pain at 1, 3, and 5 days after surgery was more than that in the control group, while the number of patients with moderate pain and serious pain was less (P<0.05). It demonstrated that the nano-silver medical antibacterial dressing had a substantial effect on alleviating postoperative dressing pain, which was superior to traditional gauze.The difference in the wound area on 1 day wasn't statistically considerable between the two groups (P>0.05). The wound area at 3 and 5 days after surgery in the test group was evidently lower in contrast to the control group (P<0.05). Compared with the traditional sterilized vaseline gauze, the nano-silver medical antibacterial dressing was helpful to promote the healing of surgery wounds more quickly (25). Follow-up records of adverse events reflected that none of the patients in the test group had postoperative reinfection, wound dehiscence, or wound hernia.In the control group, there were 3 cases of postoperative reinfection, 1 case of wound dehiscence, and 1 case of wound hernia. In contrast to the control group, the number of patients with postoperative reinfection, wound dehiscence, and wound hernia in the test group was lower (P<0.05). To sum up, the nano-silver medical antibacterial dressing was safer than the traditional sterilized vaseline gauze, which had the value of clinical promotion.

Conclusions

120 patients with early laryngeal cancer were selected as the research objects. According to the different treatments, they were averagely divided into the test group and the control group. The test group was treated with laser vocal cord surgery under a laryngoscope microscope combined with the nano-silver medical antibacterial dressing. The control group was treated with laser vocal cord surgery under a laryngoscope microscope combined with sterilized vaseline gauze.The evaluation indexes of postoperative dressing change, the wound pain degree, and wound healing time were compared between both groups to investigate the effective means of assisting wound recovery after laryngeal cancer surgery. The results reflected that the nano-silver medical antibacterial dressing helped effectively reduce postoperative dressing pain, promote patients' wound recovery, shorten hospital stay, and improve the quality of life of patients after surgery compared with the traditional sterilized vaseline gauze. Nevertheless, there are some deficiencies. This experiment is only

performed in one medical unit, and the sample size of patients is limited, which has some effects on the results. Moreover, the postoperative follow-up time is short, and enough prognostic data of patients aren't collected. Therefore, patients with surgery for laryngeal cancer will be re-included in the future for deeper research on postoperative wound repair. In conclusion, the results of this experiment provided a path reference for clinical surgery treatment and postoperative nursing intervention of laryngeal cancer.

Acknowledgments

Not applicable.

Interest conflict

The authors declare that they have no conflict of interest.

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