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Research and Development of Drug Device Suitable for Pericoronitis Disinfection

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Abstract: Objective: To solve the problems of non-uniform spraying, easy puncture and difficult to reach wisdom teeth in the treatment of pericoronitis. Methods: The design of this device includes a probe, a working part, a holding part and a storage part, the probe is located in the horizontal direction of the working part, the storage part is located in the vertical direction of the working part, the probe is provided with a cavity, the probe comprises an integrated probe, a probe body and a socket seat, the cavity from the socket seat to the probe pipe diameter is gradually reduced, the working part includes a gun body, the gun body is provided with a buffer cavity. A cylindrical piston, a return spring, an outlet pipe and a handle, the end of the outlet pipe is a conical nozzle corresponding to the tube cavity, the cylindrical piston is provided with a sealing rubber ring, the cylindrical piston is driven by the press handle in the buffer cavity, the holding part is a connecting cover, the connecting cover is provided with a liquid inlet pipe through the center hole into the bottom of the liquid storage bottle. Results: The device is designed into a pistol shape body for easy hand-holding, and the probe head is designed into a ball shape, which has no trauma and good spraying effect. Through the cylindrical piston and the spring with a certain pressure to speed up the potion infiltration. Conclusion: This device can effectively solve the ease, efficiency and safety of pericoronitis medication.

Keywords: Pericoronitis, Disinfect, Inflammation

1. Introduction

Pericoronitis refers to the soft tissue inflammation around the crown of the third molar (also known as wisdom tooth), which is one of the common oral diseases. As a narrow and deep blind bag forms between the gums and the teeth, it is easy to accumulate food debris and bacteria, and the crown gums are prone to damage caused by chewing food. As the systemic resistance drops and the bacterial virulence is enhanced, it can cause inflammation of the tissue around the crown. Because the wisdom teeth are located in the inner side of the mouth, it is not easy to treat and operate [1]. Generally, there are problems such as uneven spraying, easy puncturing and difficult to reach wisdom teeth when sterilizing and applying medicine with syringes in clinical practice, especially for patients with restricted opening [2]. At present, in daily treatment of pericoronitis of wisdom teeth, it is usually used to extract 3% hydrogen peroxide solution with a disposable syringe after the needle is bent to clean the blind bag. Although this method is simple, the injection needle may break after bending, and the needle is too sharp, which is easy to hurt the soft tissue by accident during use. Moreover, patients with pericoronitis of wisdom teeth are often accompanied by different degrees of mouth opening limitation, and the syringe is not conducive to the operation of irrigating the blind bag. At present, some studies have proposed to

optimize the flushing head, combine the flushing fluid with the syringe, and simplify the operation steps [3]. In view of this, this paper introduces a disinfection device of wisdom tooth pericoronitis to solve the problem of poor spraying effect.

2. Materials and Methods

Pericoronitis disinfection dispensing device including probe, working department, grip department and liquid storage bottle. The probe and working department are detachable connection by plug way [4]. The probe is located in the horizontal direction of the working part, the holding part and the liquid storage bottle are located in the vertical direction of the working part, and the probe is provided with a cavity.

The probe includes an integrated probe, a probe body, and a socket, and the diameter of cavity gradually decreases from the socket to the probe. The length of the probe is 0.5cm, and the probe body is 120^{o}, so as to prevent trauma caused by excessive penetration into the blind bag and facilitate cleaning operation [5]. The working department includes the body of the gun, equipped with a buffer chamber, cylindrical piston, reset spring, outlet pipe and handle, the end of the outlet pipe is the cone nozzle corresponding to the lumen, cylinder piston is equipped with a sealing rubber ring, cylinder piston in the press handle driven in the buffer chamber activity. The working part and the holding part are assembled together [6-7]. The working part comprises the gun body, the gun body is provided with a buffer cavity, a cylindrical piston, a reset spring, an outlet pipe and a handle, the outlet pipe end is a conical nozzle, forming a certain pressure water flow, the conical nozzle is exactly corresponding to the cavity. The cylindrical piston is provided with a sealing rubber ring. The columnar piston moves forward in the buffer chamber under the drive of the press handle, forming a certain pressure and spraying out the liquid medicine. The columnar piston is fixed on the inner wall of the buffer chamber by the reset spring. When the press handle is released, the columnar piston is reset under the force of the spring, and under the action of negative pressure, the liquid medicine is inhaled [8]. The holding part is the connecting cover, the connecting cover through the thread and the liquid storage bottle can be detached, the connecting cover is provided with a liquid inlet pipe through the central hole, the liquid inlet pipe through the check valve in which the buffer chamber is communicated, the connecting cover is provided with a gasket, the formation of air sealing state buffer chamber helps to draw liquid easily; The liquid inlet pipe extends into the bottom of the liquid storage bottle and ends with sponge suction ball to suck the liquid into the buffer cavity thoroughly. The connection cover is provided with an inlet pipe extending through the central hole into the bottom of the reservoir bottle. The other end of the inlet tube is connected with the buffer chamber through a check valve.

The probe is put into the blind bag to get the situation of periodontitis, and then the handle is pressed to drive out part of the air in the buffer chamber. When the handle is released, the pharmaceutical liquid in the reservoir bottle flows into the buffer chamber under negative pressure. After placing the probe in the inflamed periodontal area, the handle is pressed to spray the medicine liquid in the buffer cavity evenly into the affected area. The periodontal area is rinsed with hydrogen peroxide and with ioglycerol [9].

3. Results

The disinfection device is designed to include probe, working department, holding department and storage department. The design of each part can skillfully improve the defects of local disinfection of the ordinary syringe, which is non-invasive and can accelerate the infiltration of disinfection medicine [10]. The probe and the working part are detachable connected through the plug-in mode. The probe is located in the horizontal direction of the working part, and the holding part and the liquid storage bottle are located in the vertical direction of the working part. On the one hand, the probe head is designed into a spherical structure, which has no trauma and good spraying effect. On the other hand, through the piston and check valve for a certain pressure of washing and medicine, speed up the penetration of the potion, on the other hand, it can also be removed by the liquid storage bottle, in order to replace the liquid medicine.

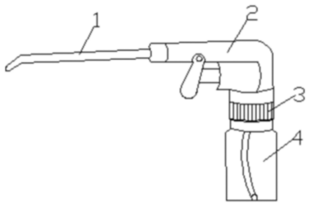

Figure 1. *Structural design of a drug device suitable for pericoronitis disinfection. 1. probe, 2. work department, 3. holding part, 4. liquid storage bottle.*

4. Discussion

This kind of disinfection device for wisdom tooth pericoronitis can not only effectively solve the problem of difficult removal of inflammation of wisdom teeth, but also solve the problems of uneven injection, easy to puncture and difficult to touch wisdom teeth when using syringe disinfection and medication [11]. The end of probe is spherical to prevent tissue injury during operation; A rinsing surface is arranged on the spherical body, and the rinsing surface is evenly distributed with microholes made by lasers. The microhole aperture is 0.1mm. A retaining wall is arranged between the end of the cavity and rinsing surface, and the rinsing surface and the retaining wall form a curved water cavity. In addition, the probe Angle can be changed 360 degrees through the socket, which is convenient for the operation of upper or lower wisdom teeth [12]. Work department and grip section are assembled and formed. By designing the working part into the shape of a pistol, it is convenient to hand-hold the medicine [13-14]. The liquid in the reservoir vial flows into the buffer chamber under negative pressure. After placing the probe in the inflamed periodontal

area, the liquid in the buffer chamber is evenly sprayed into the affected area. On the one hand, the probe head is designed into a spherical structure, with no trauma and good spray effect; On the other hand, through the piston and check valve for a certain pressure of washing and medicine, to accelerate the infiltration of the potion; On the other hand, the storage bottle can be removed to facilitate the replacement of liquid; On the other hand, the aperture of the lumen and micropores is designed to expand the water spray area and refine the drug droplets; On the other hand, by pressing the handle, driving the cylindrical piston to move in the buffer chamber, to change the air pressure of the buffer chamber, so as to easily complete the extraction and spray steps [15].

5. Conclusion

In conclusion, the design of this device can better integrate the pericoronal irrigation and the application of medicine, simple operation and convenient use. It can also realize the safety problem during operation and reduce the damage to soft tissue. The device can effectively promote the healing of pericoronitis and has great practical value and popularization value.

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