electrode lead will only assume the predefined shape on the scale that the anatomy allows. This makes later curving difficult to define. Moreover, such a pretensioned electrode lead cannot be steered with respect to the curve since the curve is fixed with this design.

Another known option is to place the electrode lead into the desired curved or bent position using precurved or steerable introducer sheaths. Even though the use of steerable sheaths is possible for this purpose, these are challenging and cumbersome in terms of the handling thereof. Additionally, sheaths, and in particular steerable sheaths, are expensive.

Finally, the option exists to guide the electrode lead using a curved stylet. However, similarly to the pretensioned electrode leads described above, the design here is not only limited, but also heavily dependent on the particular anatomic circumstances, and thus difficult to define.

Aspects of the invention are defined in the independent claim(s). Some optional features of the invention are defined in the dependent claims.

Thus, it may be possible to create an electrode lead in which the position of the implantable electrode lead is steerable in the tissue onto a defined path, without necessitating additional incisions.

The implantable extravascular electrode lead comprises an electrode lead body and an elongated pulling element. The electrode lead body extends from a distal end of the electrode lead to a proximal end of the electrode lead. The pulling element has a first end and a second end, wherein the pulling element, with the first end thereof, is connected to the electrode lead body by means of a joining site at the distal end of the electrode lead body of the electrode lead or in the distal region of the electrode lead, and the pulling element furthermore extends from the joining site to the proximal end of the electrode lead in the elongated state of the electrode lead. The pulling element extends outside the electrode lead body in the process, at least in the distal region of the electrode lead. A tensile force exerted onto the second end of the pulling element exerts a bending moment onto the distal region of the electrode lead, which results in bending of the distal region of the electrode lead.

In another exemplary embodiment, the electrode lead body of the electrode lead comprises a guide element for guiding the pulling element on the electrode lead body or in the electrode lead body. In another exemplary embodiment, the guide element is a ring, an eyelet or a sleeve.

In another exemplary embodiment, the guide element is a channel inside the electrode lead body, which extends at least along a portion of the electrode lead body.

In another exemplary embodiment, the distance between the guide element and the joining site between the pulling element and the electrode lead along the electrode lead body is at least 30 mm and no more than 800 mm.

In another exemplary embodiment, an electrode pole is arranged on the electrode lead body between the guide element and the joining site. In another exemplary embodiment, the electrode pole is designed in the form of a coil, and in particular in the form of a shock coil.

In another exemplary embodiment, the electrode lead comprises further electrode poles for stimulating body tissue and for sensing electrical signals of the tissue. These additional electrode poles are preferably implemented as rings.

In another exemplary embodiment, the electrode lead comprises a connection device for electrically and mechanically connecting the electrode lead to an implantable pulse generator or defibrillator. The connection device may be an IS4/DF4 plug, for example.

In another exemplary embodiment, the electrode lead comprises an engagement device on the electrode lead body thereof. The engagement device is preferably arranged on the electrode lead body in the vicinity of the guide element, or this engagement device forms a part of the guide element.

In another exemplary embodiment, a corresponding mating piece for the engagement device is attached at the distal end of the electrode lead or at the joining site between the pulling element and the electrode lead. The mating piece for the engagement device is designed to engage in the engagement device during insertion, so as to establish a mechanical connection between the mating piece for the engagement device and the engagement device. Preferably, in addition to

a mechanical connection, an electrical connection can also be established by the connection between the engagement device and the mating piece for the engagement device.

By means of the guide element and the engagement device, a loop or a U shape can be formed by the distal region of the electrode lead.

In another exemplary embodiment, the electrode lead comprises a first electrical conductor, which extends along the electrode lead body and connects the at least one electrode pole to the plug in an electrically conducting manner. If the electrode pole is designed as a shock coil, the first conductor can be connected to the proximal end of the electrode pole. Furthermore, this first conductor can be connected to the engagement device in a conducting manner. As an alternative, a second electrical conductor can be arranged in the electrode lead body, which connects the engagement device to the plug in an electrically conducting manner. In addition, a third electrical conductor can be provided in the electrode lead body, which connects the distal end of the electrode pole to the mating piece for the engagement device in an electrically conducting manner. In this way, it is possible to contact the electrode pole, which is preferably implemented as a shock electrode, from both sides. The proximal end of the electrode pole is thus connected via the first conductor, and the distal end of the electrode pole is connected via the second and third conductors, and the engagement device and the mating piece for the engagement device are connected to the plug in an electrically conducting manner. In this way, the conduction losses during the delivery of the shock can be minimized.

In another exemplary embodiment, the electrode lead comprises multiple guide elements for the pulling element along the electrode lead body thereof. The guide elements are arranged on the electrode lead body in such a way that the electrode lead body forms a meander when the pulling element is pulled.

In another exemplary embodiment, the pulling element can be designed in the form of a thread, a cable, a wire, a bar or a rod.

In another exemplary embodiment, the pulling element is resorbable. A (bio)resorbable pulling element shall be understood to mean a pulling element having components that can be decomposed in the body. The bioresorbability has the effect that the pulling element dissolves over a certain time period. In this way, the electrode lead can be explanted more easily.

In another exemplary embodiment, the wire or the rod can be precurved.

In another exemplary embodiment, the plug comprises a locking unit for locking the pulling element. In this way, the pulling element can be locked at the proximal end of the electrode lead. As a result of this locking unit, it is not possible to pull the pulling element back in the distal direction of the electrode lead. The locking device for the pulling element is preferably reversible.

In another exemplary embodiment, the electrode lead can comprise more than one distal end, and thus two separate distal regions. In this case, two pulling elements are provided, which are each guided separately from one another. In this way, the distal regions can be curved individually for each of the two regions.

Another exemplary embodiment relates to a system comprising an aforementioned electrode lead and a catheter. The electrode lead is guided in a catheter. The catheter can be implemented in the form of an introducer sheath. The introducer sheath can be steerable in the distal region thereof. Steerable shall be understood to mean that the distal end of the introducer sheath can be bent in at least one direction. The distal end of the introducer sheath can preferably be bent in two spatial directions. In this way, the distal end of the introducer sheath can reach all points on a spherical segment. The introducer sheath is preferably dimensioned with respect to the inside diameter thereof in such a way that the pulling element, together with the electrode lead, can be received by the sheath.

Further features, advantages and embodiments of the present invention shall be described, by way of non-limiting example only, hereafter with reference to the figures.

In the drawings:

FIGS. 1a and 1b show an electrode lead comprising an externally guided pulling cable;

FIG. 2 shows an electrode lead comprising an engagement device;

FIG. 3a to 3e show an electrode lead comprising multiple guide elements, which can form a meander;

FIGS. 4a and 4b show an electrode lead comprising two separate distal regions;

5