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ENDOTRACHEAL CATHETER

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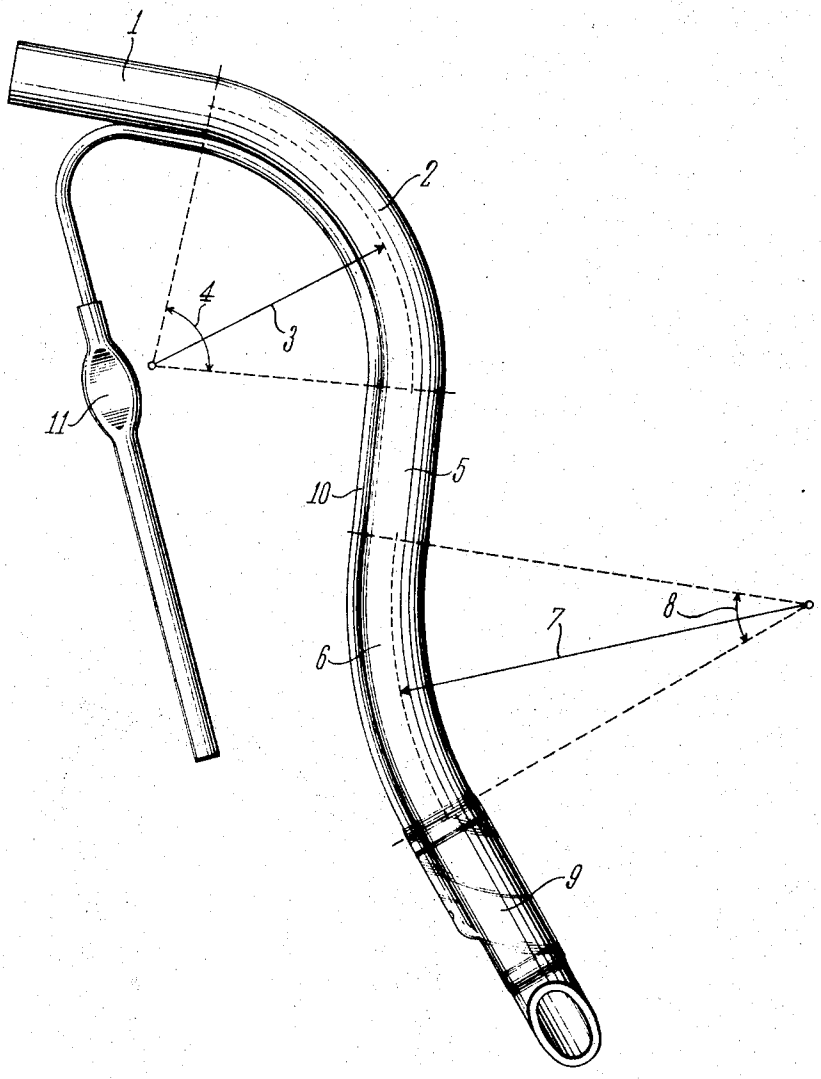

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ENDOTRACHEAL CATHETER

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The invention relates to an endotracheal catheter for anaesthetic administration.

Known endotracheal catheters consist of a tube which is curved throughout, the two ends including an angle of about 120°. A further known catheter of this type, the so-called "Oxford" catheter, has a comparatively great curvature which extends over about a quarter of a circle. Two elongated straight sections extend from the curved part. Also flexible endotracheal catheters are known which embody a wire spiral and are straight in the natural condition.

Damage to the vocal cavity could not previously be avoided with any of the known catheters. Since all these catheters do not lie smoothly in the trachea, laryngeal cramp, spasms of the windpipe and breathing difficulties can often not be avoided as a result of the pressure exerted at specific points by the catheter. Also the above-mentioned known highly flexible catheter does not prevent the aforesaid damage since these catheters press with a certain pressure on the trachea as a result of their elastic stressing.

The invention is directed to the problem of developing an endotracheal catheter in which such difficulties or damage are reliably avoided.

The invention comprises an endotracheal catheter which is of S-shape, that is commencing from the outer end, it has an approximately straight section followed by a first curved part with a radius of curvature of about 50 to 75 mm. over an arc range of 80 to 90° (included angle), this being followed by a straight section about 20 to 45 mm. long and after this a second curved section the curvature of which runs oppositely to the aforesaid curvature and extends at a curvature radius of between 75 and 95 mm. over an arc range of 35 to 50°.

The particular advantage of the invention lies in the fact that this catheter adapts itself well to the course of the trachea and nevertheless can be introduced comparatively easily and without damage into the trachea. Experiments have shown that with this catheter the complications normally to be expected, such as for example damage to the vocal cavity, laryngeal cramp, spasms of the windpipe, pressure points on the trachea or the like, are prevented and that the instrument can be satisfactorily introduced despite its curved form.

The invention is not limited to the curvatures following exact circular arcs; the invention should rather extend to those catheters in which the curvature only more or less approaches such arc forms, that is that the radius of curvature is not constant over the whole arc. In particular in the region of the transfer points from one curvature to another (or to a straight section) the radius of curvature of the two adjacent sections is progressively increased to provide a smooth transition.

Preferably the catheter is proportioned differently for male and female patients. For example, with a catheter for a male patient the first curvature is somewhat greater than the curvature for a catheter for female patients, whereas the second curvature is somewhat flatter, that is to say, the centre angle of the curvature is somewhat smaller than with the catheter for female patients.

The catheter according to the invention may embody at its inner end a bulb in known manner.

Further features of the invention will be apparent from the following description of one embodiment of the invention, together with the claims and the accompanying drawing and the individual features can be used on their own or several of them may be utilized in one embodiment of the invention.

In the embodiment shown the catheter tube of the endotracheal catheter is pre-shaped and is of S-form. An initial straight section provides the outer end of the catheter and can be of desired length; following this there is provided a first curved section **2** the radius of curvature **3** of which is about 50 to 75 mm. The arc curvature angle is between 80 to 95°, that is the central angle **4** amounts to about between 80 and 90°. The first curved section **2** is followed by a straight section which can be 25 to 45 mm. long. To the section **5** there is provided a second curved section **6** which has a curvature opposite to that of the first curved section **2** and is co-planar with the first curved section. The radius of curvature **7** amounts to between 75 and 95 mm. and the curved arc extends over 30 to 50°, i.e. the central angle **8** amounts to 30 to 50°.

The catheter tube is cut off obliquely at its inner end and embodies a bulb **9** which is connected to a control bulb **11** through a tube **10** extending externally of the catheter tube and fastened to it.

In an embodiment of the endotracheal catheter suitable for a male patient the radius of curvature of the first curve is between 50 and 60 mm. long, for example 55 mm., and the centre angle **4** is between 84 and 88° for example 86°. The intermediate straight section **5** is about 25 mm. long in this embodiment of the invention. The second curved section **6** has in this embodiment of the invention a radius of curvature **7** between 85 and 95 mm., for example 90 mm., and the central angle **8** of this curvature lies between 35 and 40° for example 37°.

In another embodiment of the endotracheal catheter according to the invention suitable for female patients, the radius of curvature of the first curve is between 65 and 75 mm. on the average, for example 70 mm., and the central angle **4** is between 80 and 85° for example 82°. The intermediate section **5** can be about 25 mm. long. The radius of curvature of the second curve is between 75 and 85 mm., for example in the average case 80 mm., and the centre angle **8** lies between 45 and 50° for example 48°.

The catheter can consist of rubber or a suitable synthetic material, for example plasticised PVC or silicone rubber. It can be made comparatively stiff since it fits well to the course of the trachea.

What I claim is:

1. An endotracheal catheter comprising a tubular component having a proximal end and a distal end, said tubular component being pre-shaped to comprise in sequence, from the proximal end, a first straight section, a first curved section conforming to the curvature in the region of the patient's pharynx and trachea, a second straight section, and a second curved section adjacent the distal end of said tubular component curved oppositely to the first curved section and co-planar therewith, said second curved section conforming to the curvature of the root of the patient's tongue in the hypopharynx.

2. A catheter according to claim **1**

wherein said first curved section has a radius of curvature of between 50 and 75 mm. and an arc curvature angle of between 80 and 90°,

said second straight section being between 25 and 45 mm. in length, and

said second curved section has a radius of curvature of between 75 and 95 mm. and an arc curvature angle of between 30 and 50°.

3. Catheter according to claim **2**, characterised in that

for a catheter for male patients, said radius of curvature of said first curved section is between 50 and 60 mm. and said are curvature angle of said first curved section is between 84 and 88°.

4. Catheter according to claim **3**, characterised in that said first curved section has a radius of curvature of 55 mm. and said arc curvature angle is about 86°.

5. Catheter according to claim **2** for male patients, characterised in that said radius of curvature of said second curved section is between 85 and 95 mm. and said arc curvature angle is between 35 and 40°.

6. Catheter according to claim **5**, characterised in that said radius of curvature of the second section is 90 mm. and said arc curvature angle is 37°.

7. Catheter according to claim **2**, characterised in that for a catheter for female patients, said first curved section has a radius of curvature between 65 and 75 mm. and said arc curvature angle is between 80 and 85°.

8. Catheter according to claim **7**, characterised in that said first curved section has a radius of curvature of about 70 mm. and an arc curvature angle of 82°.

9. Catheter according to claim **1**, characterised in that for a catheter for female patients, said second curved section has a radius of curvature of between 75 and 85 mm. and an arc curvature angle of between 45 and 50°.

10. Catheter according to claim **9**, characterised in that said radius of curvature of the second curved section is 80 mm. and said arc curvature angle is 48°.

11. An endotracheal catheter according to claim **1**, further comprising

a second tube intersecting said S-shaped tube near the proximal end thereof and extending along the exterior of said S-shaped tube and fastened thereto substantially over the length thereof, said second tube diverging from said S-shaped tube near the distal end thereof,

a balloon positioned within said S-shaped tube at the intersection of said second tube, and

a control bulb attached to said divergent end of said second tube.

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