Helica Thermal Coagulator

Laparascopic use of the Helica Thermal Coagulator: The first report on endometriosis treatment.

Summary:
Encouraging preliminary results with a simple to use, easy to maintain machine which is significantly cheaper than CO2 Laser or similar device. The low levels of power used reduces the risk of arcing to surrounding tissue and is therefore a valuable, safe instrument for laparascopic work.

Laparoscopic use of the Helica thermal coagulator: the first report

Kay Forbes Donaldson and Robert J.S. Hawthorn

Accepted for publication 6 March 1995

Summary

This is the first report on the laparoscopic use of the Helica thermal coagulator in gynaecology. A combination of helium gas and a low AC electrical current (2-8W) is used to deliver energy to tissue, giving the thermal coagulator advantages over other coagulation equipment currently available. The physical effects are controlled by modifying the power to produce effects similar to those of the carbon dioxide laser. The tissue effects of the coagulator are discussed and the operative techniques in treating endometriosis and at ovarian cystectomy are described. Preliminary impressions are very

encouraging for this instrument, which is simple to use, easily maintained and is significantly cheaper than a CO2 laser or similar device. Because of the low levels of power used, the risk of arcing to surrounding tissue is significantly reduced and therefore it appears to be a valuable, safe instrument for laparoscopic use.

Keywords: endometriosis, laparoscopy, ovarian, cystectomy, thermal coagulator.

Introduction

The Helica thermal coagulator (HTC) (Helica Instruments Ltd, Research & Development Park, Heriot Watt University, Edinburgh) is a new device and this is the first report concerning its clinical use. The soft tissue coagulator uses a combination of helium gas and alternating current to deliver energy to tissue. Its main advantage over other equipment currently available for achieving coagulation and haemostasis is the use of very low power levels, of between 2 and 8 watts, in laparoscopic mode. The physical effects can be controlled by modifying the power to such an extent that it is possible to cauterize tissue to a depth of one cell thickness. It produces effects, therefore, that are similar to those of the carbon dioxide laser, but it is probably more closely related to the argon beam coagulator, although the power output is significantly less than that of the latter.

Correspondence: R.J.S. Hawthorn, Department of Gynaecology, Southern General Hospital NHS Trust, Govan Road, Glasgow, G51 UK.

Mode of action of the soft tissue coagulator

A coaxial flow of helium carries electrons from a unipolar electrode to the target tissue. Although the device can be used at higher powers for open surgery, at the low power output used for laparoscopic surgery a return electrode is not required, unlike other diathermy devices. The energy is delivered efficiently in a non-touch mode via the helium gas, which is easier to ionize than carbon dioxide, air and argon. Since the interaction between the electrons and tissue is in helium, no smoke develops. The coaxial flow of gas, at 2.21 min - 1 disperses blood and fluid from the tissue before impact. This allows the energy to be concentrated on bleeding vessels.

The amount of energy delivered to tissue is dependent on the distance from the probe to the tissue at any given power output. The tissue effects are similar to those of unipolar diathermy and laser, with thermal necrosis to a level of one cell thickness possible at lowest outputs. Since fine tissue destruction is possible, in addition to

haemostasis, the main uses in gynaecological laparoscopy would appear to be in the management of endometriosis and in situations where achieving haemostasis may be difficult using other currently available modalities.

Clinical use of the Helica thermal coagulator

The technique for using the soft tissue coagulator laparoscopically involves a three or four puncture approach employing 5mm lower abdominal cannulae. The HTC is set to its lowest power (2-8W) and the trim is adjusted to provide fine power changes. With the laparoscopic probe held 3-5mm away from the and perpendicular to the tissue, the foot pedal is depressed. A directional flame becomes an arc flame at 800oC when it is moved closer to the tissue. The effects are clearly seen with the non-touch technique, and since no smoke occurs vision is easily maintained. The helium jet blows blood and debris away from the contact site and keeps it dry. Since large areas of peritoneum can be destroyed quite rapidly and safely, the actual operating time using the HTC is significantly reduced compared with other modalities. Unlike laser therapy, no theatre modifications are required. A total of 10 symptomatic patients with a proven diagnosis of endometriosis were treated using the HTC. Four had an endometrioma of one ovary, and all of these had superficial peritoneal or ovarian endometriosis in addition. Six patients had only superficial endometriosis involving the peritoneum and one or both ovaries. In two of the patients with an endometrioma this was incised and the contents irrigated and the capsule thoroughly inspected. It was possible to enucleate the cyst lining from the ovary using traction and counter-traction. However, in order to achieve haemostasis, the HTC was applied to the residual ovary. In the other two patients the endometrioma could not be removed easily; the lining of the endometrioma was ablated using the HTC. In all patients superficial endometriosis was ablated using the HTC. Uterosacral nerve ablation was not performed. The HTC has been used in eight patients to control bleeding from the bed of the ovary from which an ovarian cyst has been removed. Half of these involved removal of unilateral dermoid cyst. In one patient the HTC was used to control bleeding over the bladder base at laparoscopic hysterectomy. All the above procedures have been completed without adverse events. Follow up of these who had endometriosis treated revealed one patient with persisting pain. This woman had experienced premenstrual pain on a cyclical basis in the upper abdomen and laparoscopy revealed endometriosis in the parietal peritoneum over liver. With a four puncture approach the area was exceptionally difficult to treat as the probe could not be applied to the lesion at a satisfactory angle. Modifications to the probe are in progress.

Conclusions

Initial experience with the HTC suggest that it is a simple, safe, quick and effective way of achieving haemostasis in gynaecological laparoscopic surgery and for treating superficial deposits of endometriosis. The probes are disposable and cost approximately £45 each. In addition to the laparoscopic use of the HTC it can easily be used during open surgery using different handpieces. Further developments in its laparoscopic use need to be explored, such as uterosacral nerve ablation, presacral neurectomy and myomectomy.