Monopolar and bipolar diathermy

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In monopolar surgery (Figure 7.18a), the electrical current created in the ESU passes through a single electrode (diathermy pencil) to the tissue, causing the desired tissue e ff ect (cut or coagulation). To complete the cycle, the current then passes through the tissues and returns via a very large surface plate (the indi ff erent electrode or disper sive cable) back to the earth pole of the generator. In bipolar diathermy (Figure 7.18b), the two active elec - trodes are usually represented by the limbs of a pair of dia - thermy forceps, blades of scissors or graspers. Both forceps ends are therefore active and current flows between them and only the tissue held between the limbs of the forceps heats up. This form of diathermy is used when working in sensitive areas (e.g. near the recurrent laryngeal nerve in thyroid surgery) or in patients with implantable electrical devices, as current can interfere with these devices. A se parate return electrode (the indi ff erent electrode) to return current is not needed. Figure 7.18 (a)

unit Active cable Active electrode Dispersive Patient cable plate Monopolar diathermy (a) The principles of diathermy. Monopolar diathermy. TABLE 7.4 Comparison of cutting and coagulation of tissue using diathermy. Cutting Coagulation Lower voltage current Higher voltage current Continuous (current is ‘on’ 100% of the time when Interrupted (current /f_l ows 6% of the time and off for the remaining 94%) used) Energy concentrated over a small area Energy dispersed over a large area The modulated current allows the tissue to cool slightly, so tissue heating is slower Tissue is heated rapidly and to a higher temperature, than with cutting mode. This causes a dehydration effect (loss of cellular /f_l uid causing vaporisation of tissue and thereby resulting in and protein denaturation), resulting in coagulation of tissue. Dehydration is not as ‘cutting’ tissue effective as vaporisation for cutting tissue but is ideal for haemostasis. Bleeding is stopped by a combination of the distortion of the walls of the blood vessel, coagulation of the plasma proteins and stimulation of the clotting cascade Minimal lateral spread and collateral damage Extensive lateral spread Similar to cutting and works best when held just above the tissue, with no contact Cutting divides tissue by generating sparks, which arc or minimal contact with tissue to the tissue; this is most ef /f_i cient when the tip is held just above the tissue Uses: coagulation and achieving haemostasis Uses: clean cut of tissue To be used to dissect and divide tissue and not just to make skin incisions

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