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Monopolar Cautery and Adverse Effects on Cochlear Implants
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IMPORTANCE: The use of monopolar cautery has been widely regarded as a contraindication in the setting of a cochlear implant because of presumed risk to the implant device. There are very limited data to support this contraindication.
OBJECTIVES: (1) To evaluate the effects of monopolar cautery on cochlear implant devices. (2) To determine whether monopolar cautery changes the endocochlear temperature in an implanted cochlea.
DESIGN: Sixteen cochlear implants from 3 manufacturers (Advanced Bionics LLC, Cochlear Americas Ltd, and Med-El Ltd) were implanted into 2 unembalmed, fresh cadavers. Monopolar cautery was applied to either the tongue or abdomen at coagulation settings of 10 W or 50 W for 30 minutes. Impedance and integrity testing were performed before, during, and after 30 minutes of cautery. The temperature in the endocochlear perilymph was measured during cautery. After explantation, devices were returned to the manufacturer for an in-depth “failure” analysis according to each manufacturer’s current protocol evaluating explanted devices.
SETTING: Basic science laboratory, tertiary medical center.
PARTICIPANTS: Cadaveric study.
INTERVENTION: Application of monopolar cautery to implanted cochlear implants in a cadaveric model.
MAIN OUTCOME AND MEASURE: (1) Changes to the implanted devices either during electrocautery or following failure analysis. (2) Changes in the intracochlear temperature.
RESULTS: No change in impedance, integrity testing, or failure analysis occurred at any cautery setting when applied to either the oral cavity or abdomen. The temperature of the cochlea did not increase with up to 30 minutes of cautery at a setting of 50 W. Comprehensive device analysis did not show any evidence of device damage at the conclusion of the study.
CONCLUSIONS AND RELEVANCE: Monopolar cautery did not produce detectible damage to any of the cochlear implant devices or produce detectible temperature change in the cochlea at low or high levels of cautery in the oral cavity in this experimental model.

モノポーラメスの人工内耳に対する影響について

背景：人工内耳埋め込み後のモノポーラメスの使用については、埋め込みデバイスへの影響が予想されるため禁忌とされているが、実際のデータは少ない。
目的：(1)人工内耳に対するモノポーラメスの影響を評価する。(2)モノポーラメスの使用により人工内耳内の温度上昇が生じないかを検討する。
デザイン：3 社(Advanced Bionics LLC, Cochlear Americas Ltd, Med-El Ltd)16 機の人工内耳が 2 体の死体に埋め込まれた。モノポーラメスは、10W/50W で 30 分間舌または腹部に使用された。
場所：基礎研究室・病院。
参加者：死体に対する研究。
介入：人工内耳を埋め込んだ死体モデルに対してモノポーラメスを使用。
アウトカム：(1)メス使用中のデバイス故障や事後検査での故障判定。(2)蝸牛内の温度上昇。
結果：口腔内・腹腔に対しどの設定でメスを使用しても、インピーダンス・デバイス故障等は生じなかった。50W の設定では 30 分までは蝸牛の温度上昇は認めなかった。デバイスの検査でも損傷は認めなかった。
まとめ：この実験モデルにおいて、口腔内においてモノポーラメスを使用した時、高エネルギー・低エネルギーに関わらず蝸牛において検出可能な温度上昇やデバイスの損傷を起こすことはなかった。

Table. Temperature Changes Within the Cochlea[a]

Device	Start	Minutes			
		1	5	10	30
1	16.7	ND[b]	15.6	15.2	15.1
2	16.0	15.8	15.3	15.0	15.1
3	15.6	15.7	15.3	15.3	15.3
4	16.1	16.1	16.0	15.1	14.5

Abbreviation: ND, no data.

[a] All data are given as temperature readings in degrees Celsius.

[b] The temperature probe fell out of the cochlea, and when checked at the end of 1 minute the reading was 18.5°C. The room temperature was also measured at 18.5°C.