

INDIRECT LIGHTNING STRIKE VIA TELEPHONE

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INTRODUCTION

A patient who experienced a lightning strike down a telephone wire is described. She suffered various injuries, particularly to her ears and her menstrual cycle was disrupted.

CASE REPORT

A 27-year-old woman was indirectly struck by lightning at her home while using the telephone during a thunderstorm. She heard a loud bang mediated through the telephone into her left ear and was thrown across the room. The telephone went dead and the bulb in the room fused. She was briefly unable to speak or hear. The left half of her face and body felt numb and she suffered from temporary left-sided hemiparalysis. She noticed shooting pains and ringing in her left ear and watering from her left eye. Within 20 min she was able to communicate and move her limbs, and the numbness in her limbs disappeared. She did not experience chest pain, breathing difficulties or visual disturbances.

On arrival at hospital 4 h later, she complained of severe pain, tinnitus and deafness in her left ear and numbness on the left side of her face and neck. She did not have amnesia and was conscious and fully orientated. Her ECG, pulse and blood pressure recordings were within normal limits. Her power, tone and reflexes were normal in all four limbs and there was no facial nerve involvement. She exhibited marked Lichtenberg figures (dendriform skin patterns) over both sides of her chest and upper neck and some marks on her knees, caused by standing in contact with the radiator. These cutaneous ferning patterns disappeared within 24 h. Her ear was kept dry and she was discharged after a few days.

Her left tympanic membrane had subtotal perforation surrounded by a blood clot. Rinne's test was positive (bone conduction > air conduction) and Weber's test was lateralized to the left ear. An audiogram showed left-sided sensorineural deafness.

At review 6 months later she still complained of minimal persisting tinnitus and was deaf in her left ear. An unusual effect experienced was that on the day after the lightning injury, she had her menses 7 days ahead of time, and for 3 months her menstrual cycle remained at 23 days as compared with her pre-incident 30 day cycle. The ovulation time remained unchanged on day 15 (as noted by the body temperature change).

DISCUSSION

Lightning surges can enter via the telephone conductors, the electricity supply conductors or any buried metal pipes for water and gas if no protection is provided. When the potential difference between the remotely earthed telephone system and power earth exceeds the sparkover voltage (10,000 V for a person with one ear touching the telephone and some part of the body touching an 'earth'), a discharge will occur.¹ In telephone related injuries, depending on the distance from the strike point, currents of up to 3-5 kA are involved. A direct strike involves a current of about 30 kA.¹

The pathognomonic skin ferning is temporary, fading within 24 h, and is caused by a partial inflammatory response to ionization and heat effects produced by the current flow that spreads in all directions as it enters an insulating surface.² The temporary paralysis (Charcot's paralysis or keraunoparalysis) and paraesthesiae could be due to thermal, electrical or secondary vasomotor effects (the exact mechanism remains obscure); it was described by Charcot in 1889.³

The ear is damaged by burns due to electrical effects, by vasomotor effects and by barotrauma - telephone injuries with sound pressure levels of 150 to 160 dB have been recorded.⁴ The neural tissue is most susceptible to current flow followed by blood vessels, muscle, skin, tendon, fat and bone in ascending order of resistance.⁵ As the cochlea is surrounded by the bone of otic capsule (except medially), the entry point for the current could more easily be through the internal auditory meatus through cochlear neurons and low resistance cerebrospinal fluid.

The reason for the change in the menstrual cycle length is possibly due to the electric shock and the psychological shock causing an alteration in rhythm acting at the hypothalamic level. The exact mechanism and the significance of this effect remain uncertain.

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