

Copper Intrauterine Device Filament Breakage Visualized on Ultrasound

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INTRODUCTION

Copper IUDs are highly effective contraceptives (>99% efficacy) providing up to 10 years of protection. Contraceptive efficacy depends on copper release creating spermicidal effects through ion release and local inflammatory response. Structural integrity is crucial for effectiveness.

Rare complication:

Copper filament fracture from prolonged intrauterine exposure. Progressive corrosion from uterine secretions leads to fragmentation, reducing copper surface area and potentially compromising contraceptive function. Modern silver-core reinforcement reduces oxidation rates.

Risk factors for Copper Filament Fracture:

Duration >10 years, electrolyte-rich uterine environment, pH fluctuations, mechanical stress from contractions, junction point stress concentration and Individual variations in copper wire quality.



Figure 1. Three-dimensional ultrasound reconstruction of copper IUD in utero demonstrating structural discontinuity of copper wire loops (arrows indicate fracture sites).

CASE REPORT

Patient: 53-year-old, G2P2, married, copper IUD user for 15 years total (current device 5 years)

Presentation: Routine transvaginal ultrasound, asymptomatic, normal cycles

Imaging findings:

2D transvaginal US: Well-positioned IUD, normal endometrial thickness, suspicious discontinuity areas

3D ultrasound (Figure 1): Clear structural rupture at TWO distinct points at junction between vertical stem and horizontal arms, visible gaps in copper wire loops, normal surrounding tissues

Management: Hysteroscopic removal

Device Analysis (Figure 2): Confirmed copper filament fracture with corrosion and clean breaks at stress points

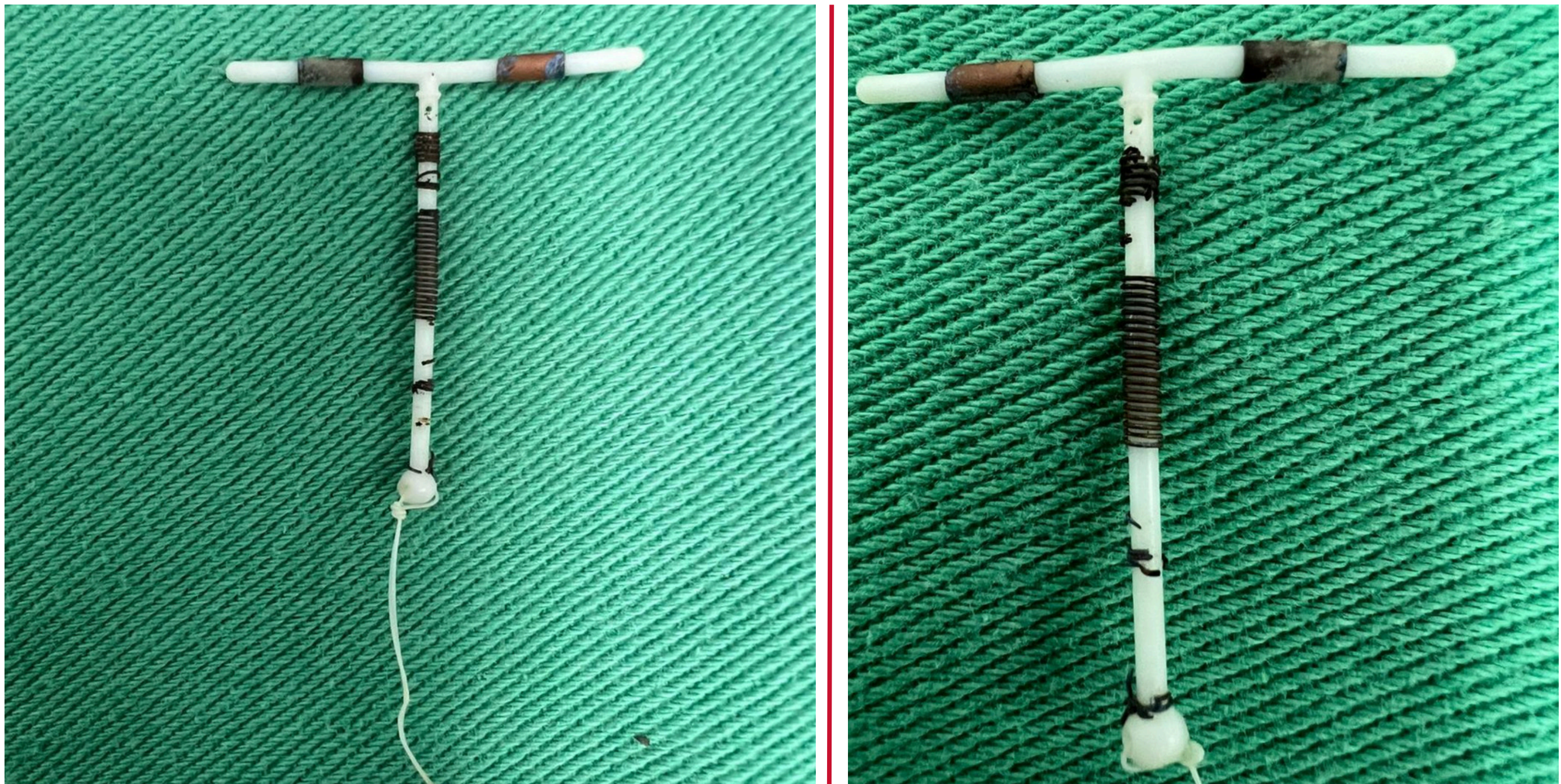


Figure 2. Macroscopic examination of extracted copper IUD showing multiple copper filament fractures. Note the discontinuity of copper wire at junction points between vertical stem and horizontal arms, with intact white polyethylene core.

DISCUSSION

Pathophysiology: Electrolyte environment, pH fluctuations during menstrual cycles, mechanical fatigue from uterine contractions create stress concentration at junction points.

Literature Insights:

- Kosonen (1978) - 30% fragmentation after 4 years with 0.2mm wire diameter.
- Asch et al. (2013) - ultrasound detection of copper sheath discontinuity.
- Delić (2021) - fragmentation after 20 years.
- Zimmermann (2009) - spontaneous fragment expulsion.

Clinical significance: 3D ultrasound superior to 2D for structural assessment. Risk increases exponentially with duration. Modern silver-reinforced devices show improved resistance.

Key Findings:

Structural fracture can occur even in asymptomatic patients with normal menstrual patterns.

CONCLUSION

- Copper filament fracture can occur in asymptomatic patients
- 3D ultrasound effectively detects structural abnormalities enabling timely intervention.
- Case demonstrates successful hysteroscopic management.

RECOMMENDATIONS:

- Regular ultrasound monitoring for users >10 years, utilize 3D imaging when available, consider prophylactic replacement in very long-term users, patient education about device complications, favor modern silver-reinforced devices.