

# Phaco Tip Comparison: Mini-flared 12° Bent Ozil® 30° vs Intrepid® Balanced Tip 30°

Conversation transcript — peripheral fragment purchase / holdability

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## Question (Surgeon)

I am a cataract surgeon and use two types of phaco tip: the **Mini-flared 12° bent tip (Ozil®) 30°** and the **Balanced Tip 30°**.

I have found that the Mini-flared 12° bent tip (Ozil®) 30° is more efficient at suctioning cataract fragments from the peripheral area than the Balanced Tip 30°.

I assume this is because the mini-flared tip has a slimmer edge than the balanced tip, which means the slimmer edge can purchase and catch cataract fragments more easily.

Have other people described the same observation? Are there any articles to support this? Please elaborate with reference sources.

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## Response (Claude)

Your observation is interesting, and it sits at a nuanced spot in the phaco-tip literature. Most published studies have framed tip comparisons around *emulsification* efficiency (CDE, US time, BSS use) rather than *purchase/holdability* on peripheral fragments, so the answer depends on which metric you care about. The two need to be separated.

## What the literature generally says (emulsification efficiency)

When researchers compare the Intrepid® Balanced tip against the Kelman / mini-flared tip on torsional systems, the **Balanced tip usually wins on efficiency**. The Balanced tip has a double bend that allows the distal end to reach an oscillation amplitude of up to ~192 µm versus ~130 µm for the Kelman tip, which translates into roughly 50% more lateral displacement at the working end and approximately 29% faster fragment removal in vitro at matched settings (Zaugg / Boulter, Moran Eye Center; reported in *Ophthalmology Times*). Clinical studies (Bozkurt Oflaz et al., *Int J Ophthalmol* 2015; the *Journal of Current Ophthalmology* 2022 paper that directly compared the 30° Ozil®, 45° Kelman®, and Intrepid® Balanced tips on the Centurion) likewise show lower CDE and US time with the Balanced tip.

## Where your observation fits (holdability / fragment purchase)

Holdability and emulsification are *different* properties, and on holdability the literature actually supports your impression:

- **Smaller aperture → stronger occlusion seal → better grip.** Helvac■o■lu et al. (*J Cataract Refract Surg* 2014; summarized in *Turk J Ophthalmol*) explicitly note that "surgeons get used to using 30° Kelman tips since the smaller holding surface of this tip, when compared to 45° tips, provides better control over the nucleus material." The 30° bevel of the Ozil® tip presents a smaller distal opening than a 45° bevel does on the same outer-diameter shaft, so for a given vacuum it generates a tighter seal — exactly what is felt as the tip "purchasing" a peripheral fragment.

- **Less distal bending** → **straighter vacuum vector**. The 12° bent Ozil® tip is less angulated than the 22° bent Kelman, and Steven Dewey (*CRSToday*, "Which Phaco Tip?") makes the related point that less-bent needles "form a tighter vacuum seal when embedded in the nucleus and thus produce a stronger grip." The Balanced tip's double-bend geometry maximizes distal oscillation amplitude, but that same geometry slightly compromises the on-axis suction vector compared with a more axial Ozil® mini-flared tip.
- **Wall thickness and edge profile**. Tjia (*CRSTEurope* 2012, "A New Torsional Phaco Tip") observes that thinner tip walls correspond to slightly greater cutting-edge displacement at the rim. The mini-flared design narrows the shaft just proximal to the flared port, which gives a relatively thin, sharp distal lip — the "slimmed edge" intuition. The Intrepid Balanced tip's reinforced double-bend geometry necessarily has a less knife-like distal edge.
- **Surgeon reports of "outside-in" technique**. *CRST Global*, "Vertical Phaco Chop With the Infiniti," recommends precisely the 45° mini-flared Kelman tip *because* of its holdability when chasing peripheral material — supporting the more general principle that mini-flared geometries grip well.

## Bottom line

The hypothesis is well-founded for the specific task described — pulling peripheral fragments out of the bag. The Balanced tip is built for energy delivery and emulsification throughput; the 30° mini-flared 12° Ozil® tip is built for occlusion, grip, and controllable purchase, and that is the property being exploited. There does not appear to be a head-to-head study with "peripheral fragment retrieval time" as a primary endpoint (a publication gap worth noting), but the geometric arguments and surgeon commentary above all line up with this clinical impression.

## References

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5. Tjia K. *A New Torsional Phaco Tip*. *CRSTEurope*. Feb 2012. <https://crstodayeurope.com/articles/2012-feb/a-new-torsional-phaco-tip/>
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