Beveled Vs. Perpendicular Incisions: The Effects on Wound Healing and Scar Tissue Formation

Joseph De Leon MS, Mojtaba Wali DDS, Georgios Romanos DDS, PhD, Prof Dr med dent

Stony Brook School of Dental Medicine

Introduction

- Proper wound healing is a high priority in most surgeries (decrease in scar tissue formation).
- Wound healing can be modified through incision techniques.
- Literature has suggested different surgical outcomes between beveled and perpendicular

Objectives

•Analyze the effects on wound healing between beveled vs. perpendicular incisions in various fields of surgery.

•Elucidate trends revolving the optimal incision angle.

•Understand the physiologic mechanisms relating wound healing and incision technique.

Methods

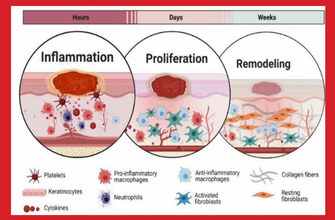
•Google scholar searches for articles that compared incision angles in various fields of surgery

•Particular focus on beveled vs. perpendicular incisions

•Excluded studies:

One incision type

Not revolved around incision angle



Results:

Field	Favored incision type	Evidence	Reference
Plastic surgery	Beveled	Beveled incision doubles the area of dermal ayer	Feinendegen et al., 2018
	Beveled	Beveled 20-degree incision displays less scar formation and lower inflammation	Feinendegen et al., 2019
Dermatology	Beveled	Allows complete removal of tumor, tissue easy to flatten	Yu et al., 2019
	Perpendicular	Improved esthetics of secondary intention wound-healing, lower chance of tumor transection	Yu et al., 2019
Periodontal Surgery	Beveled	Wider tissue interface, faster	Kon et al., 1984
	Beveled	reorganization	Sabeti et al., 2021
		Accelerated wound healing	
	Perpendicular		Sabeti et al., 2021
		Similar wound healing 28 days post-surgery	
Ophthalmic surgery	Beveled (smaller angle)	Tighter seal of incision edges at high IOP	Taban et al., 2004
	Beveled (larger angle)	Tighter seal of incision edges at low IOP	Taban et al., 2004

Discussion

Beveled incisions:

- ↑Esthetics (plastic surgery)
- ↑Wound healing potential (plastic surgery)
- ↓wound gaping ⇢ ↓infection (ophthalmology)
- Accelerated healing (periodontal surgery, dermatologic surgery)

Perpendicular incisions (dermatologic surgery):

- ↓Risk of tumor transection
- ↑histologic imaging
- Reliability/ease

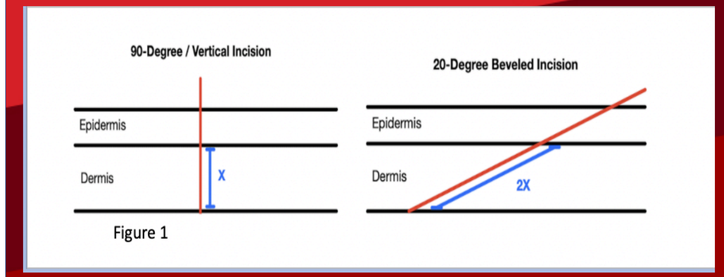


Figure 1

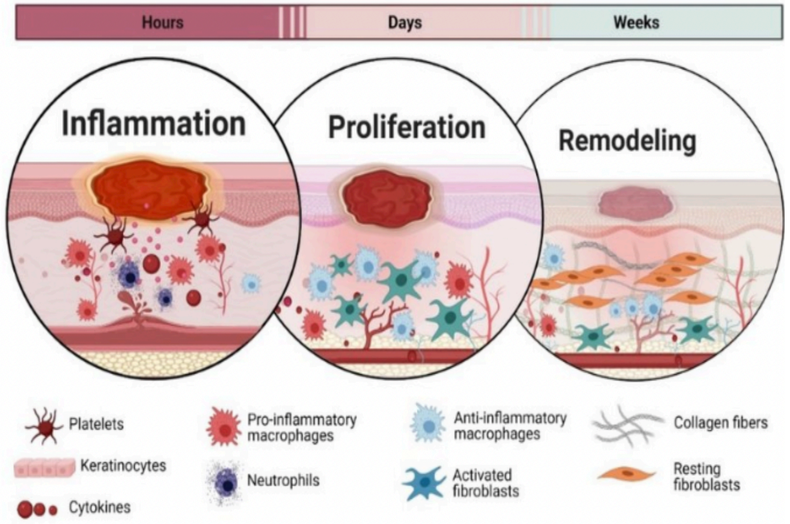
Conclusion

- Literature seems to favor beveled incisions. However, perpendicular incisions have a place in surgery .
- Decision is dependent on surgeon preference and nature of surgery.
- There are limited studies with in-depth comparisons.
- Extent of superior incision type cannot be concluded.
- Further research needed.

Stony Brook
School *of* Dental Medicine

Introduction

- Proper wound healing is a high priority in most surgeries (decrease in scar tissue formation).
- Wound healing can be modified through incision techniques.
- Literature has suggested different surgical outcomes between beveled and perpendicular incisions.



Petkovik et al., 2021

Objectives:

- Analyze the effects on wound healing between beveled vs. perpendicular incisions in various fields of surgery.
- Elucidate trends revolving the optimal incision angle.
- Understand the physiologic mechanisms relating wound healing and incision technique.

Stony Brook
School *of* Dental Medicine

Methods:

- Google scholar searches for articles that compared incision angles in various fields of surgery
- Particular focus on beveled vs. perpendicular incisions
- Excluded studies:
  - One incision type
  - Not revolved around incision angle

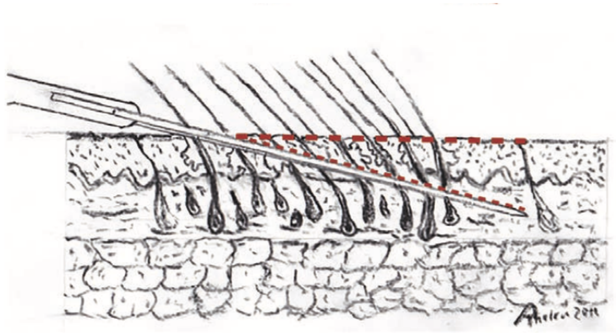
Field	Favored incision type	Evidence	Reference
Plastic surgery	Beveled Beveled	Beveled incision doubles the area of dermal ayer Beveled 20-degree incision displays less scar formation and lower inflammation	Feinendegen et al., 2018 Feinendegen et al., 2019
Dermatology	Beveled Perpendicular	Allows complete removal of tumor, tissue easy to flatten Improved esthetics of secondary intention wound-healing, lower chance of tumor transection	Yu et al., 2019 Yu et al., 2019
Periodontal Surgery	Beveled Beveled Perpendicular	Wider tissue interface, faster reorganization Accelerated wound healing Similar wound healing 28 days post-surgery	Kon et al., 1984 Sabeti et al., 2021 Sabeti et al., 2021
Ophthalmic surgery	Beveled (smaller angle) Beveled (larger angle)	Tighter seal of incision edges at high IOP Tighter seal of incision edges at low IOP	Taban et al., 2004 Taban et al., 2004

Results:

- In favor of beveled: 4 studies
- in favor of perpendicular: 0 studies
- No difference: 1 study
- Benefits of both: 1 study

Stony Brook
School *of* Dental Medicine

Discussion:



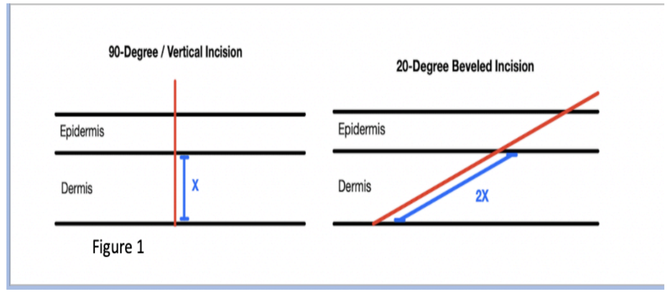


Figure 1

Beveled incisions:

- ↑Esthetics (plastic surgery)
- ↑Wound healing potential (plastic surgery)
- ↓wound gaping ⇢ ↓infection (ophthalmology)
- Accelerated healing (periodontal surgery, dermatologic surgery)

Perpendicular incisions (dermatologic surgery):

- ↓Risk of tumor transection
- ↑histologic imaging
- Reliability/ease

Conclusion:

- Literature seems to favor beveled incisions. However, perpendicular incisions have a place in surgery .
- Decision is dependent on surgeon preference and nature of surgery.
- There are limited studies with in-depth comparisons.
- Extent of superior incision type cannot be concluded.
- Further research needed.

Stony Brook
School *of* Dental Medicine

1.Morrow, B. T. (2020). Plastic surgery techniques for wound coverage. *Surgical Clinics of North America*, *100*(4), 733–740. https://doi.org/10.1016/j.suc.2020.05.005

2.Lemperle, G. (2020). Prevention of hyper- and hypotrophic scars through surgical incisions in the direction of the “main folding lines” of the skin. *Plastic and Aesthetic Research*, *2020*. https://doi.org/10.20517/2347-9264.2020.14

3.Feinendegen, D. L., Tremp, M., & Roldán, J. C. (2018). Flat incision technique for reconstructive brow surgery. *Plastic and Reconstructive Surgery - Global Open*, *6*(2). https://doi.org/10.1097/gox.0000000000001684

4.Feinendegen, D. L., Waldkircher, N. J., Bannwart, F., Kalbermatten, D. F., & Tremp, M. (2019). Outcome of beveled versus vertical incision technique after reconstructive or aesthetic facial surgery. *Plastic and Reconstructive Surgery - Global Open*, *7*(5). https://doi.org/10.1097/gox.0000000000002286

5.Yu, S. H., Olbricht, S. M., & Tiger, J. B. (2019). A single-institution Retrospective evaluation of Mohs incision angles and histopathologic specimen quality. *International Journal of Dermatology*, *58*(10), 1210–1211. https://doi.org/10.1111/ijd.14591

6.Allen EP. Use of Mucogingival Surgical Procedures to Enhance Esthetics. *Dental Clinics of North America*. 1988;32(2):307-330. doi:10.1016/S0011-8532(22)00342-1

7.Burgess LPA, Morin GV, Rand M, Vossoughi J, Hollinger JO. Wound Healing: Relationship of Wound Closing Tension to Scar Width in Rats. *Archives of Otolaryngology–Head & Neck Surgery*. 1990;116(7):798-802. doi:10.1001/archotol.1990.01870070046008

8.Nedelec B, Ghahary A, Scott PG, Tredget EE. CONTROL OF WOUND CONTRACTION: Basic and Clinical Features. *Hand Clinics*. 2000;16(2):289-302. doi:10.1016/S0749-0712(21)00204-3

9.Kon S, Caffesse RG, Castelli WA, Nasjleti CE. Vertical releasing incisions for flap design: clinical and histological study in monkeys. *Int J Periodontics Restorative Dent*. 1984;4(1):48-57.

10.Sabeti M, Moeintaghavi A, Shiezadeh F, Salari Sedigh H, Tay R, Torabinejad M. Clinical and Histological Evaluation of Tissue Healing in Beveled or Perpendicular Vertical Releasing Incision. *Journal of Endodontics*. 2021;47(10):1625-1630. doi:10.1016/j.joen.2021.07.005

11.Bahat O, Handelsman M. Periodontal reconstructive flaps--classification and surgical considerations. *Int J Periodontics Restorative Dent*. 1991;11(6):480-487.

12.Taban, M., Rao, B., Reznik, J., Zhang, J., Chen, Z., & McDonnell, P. J. (2004). Dynamic morphology of sutureless cataract wounds—effect of incision angle and location. *Survey of Ophthalmology*, *49*(2). https://doi.org/10.1016/j.survophthal.2004.01.003