

Outcomes of Irradiated Polyglactin 910 Vicryl Rapide Fast-Absorbing Suture in Oral and Scalp Wounds

• Dimitri Aderriotis, DDS •
• George K.B. Sándor, MD, DDS, FRCD(C), FRCS(C), FACS •

A B S T R A C T

Background: This study evaluated the outcome of wounds closed with irradiated polyglactin 910 (IRPG) Vicryl Rapide (Ethicon, Somerville, N.J.).

Method: Seventy-one patients with 80 oral wounds and 42 patients with 42 scalp wounds closed with IRPG were evaluated on the day of surgery, then one, seven, 14, 28 and 90 days following surgery. The incidence of inflammation, suppuration and hypertrophic scarring was recorded, along with the timing of spontaneous suture disappearance. This suture material was compared with polytetrafluoroethylene (PTFE) sutures used in dental implant patients, traditional polyglycolic acid (PGLA) sutures used in osteotomy patients and skin staples used in patients with scalp wounds.

Results: In the group with intraoral wounds, there were two cases of suppuration with no inflammatory reactions or hypertrophic scarring when IRPG sutures were used, compared to three cases of suppuration with the traditional PGLA sutures. In the group with scalp wounds, there was no suppuration or hypertrophic scarring with IRPG sutures and one inflammatory reaction with skin staples. IRPG sutures never required removal, while all staples, PGLA and PTFE sutures eventually required separate removal.

Conclusion: Irradiated polyglactin 910 Vicryl Rapide is a useful suture material with both intra- and extraoral applications in the pediatric and adult populations.

MeSH Key Words: inflammation; sutures; wound healing.

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A variety of absorbable and non-absorbable materials, ranging from animal derivatives to synthetic polymers, are used for suturing. Silk suture, a non-absorbable material, is easy to tie and can be used effectively to oppose wound edges. Unfortunately, the braided nature of silk suture allows surface debris and bacterial accumulation, resulting in inflammation of the surrounding wound.¹ As with all non-absorbable materials, this type of suture must be manually removed. Nylon sutures, another type of non-absorbable material, are monofilament strands with no interstices. They are less prone to harbour bacteria or to cause wound reaction.¹ When nylon sutures are used intraorally, however, their cut edges are very sharp and tend to bother patients. That is not the case for the non-absorbable polytetrafluoroethylene (PTFE) sutures, which are well tolerated and accompanied by almost no inflammation, even in intraoral wounds.² PTFE sutures, however, are

expensive. Finally, metallic staples — another variety of non-absorbable suture — can be used on scalp wounds, but patients may find them painful.

Absorbable sutures made from animal derivatives such as gut and chromic gut generally require no suture removal. As these materials break down, however, their by-products may result in wound inflammation.¹ The polyglycolic, polylactic acid polymer-derived sutures (PGLA), such as Vicryl (Ethicon, Somerville, N.J.) and Dexon (Davis & Geck, Montreal, Que.), are absorbed via enzymatic degradation by hydrolysis, resulting in less inflammation.³⁻⁵ These sutures are well suited for deeper layer, non-surface closure. When used on the surface, however, they remain for at least four to six weeks, accumulating debris at the wound site and often necessitating manual removal.

Irradiated polyglactin 910 (IRPG) Vicryl Rapide (Ethicon, Somerville, N.J.) is a braided co-polymer of glycolic and lactic

Table 1 Comparison of IRPG, PTFE and PGLA sutures in intraoral wounds

	IRPG	PTFE	PGLA
Osteotomy	34	0	24
Implants	20	22	0
Trauma	26	0	0
Complications	2 (suppuration)	0	3 (suppuration)
Suture removal required	0	22	24

Table 2 Comparison of IRPG and staples in scalp wound closure

	Staples	IRPG
Number of patients	42	42
Inflammatory reaction	1	0
Suppuration	0	0
Hypertrophic scarring	0	0
Alopecia	0	0
Pain score	6.7	1.82
Patient preference	0	42

acid that is surface treated with polyglactin 370 and calcium stearate⁶ and has received gamma radiation. This radiation alters the suture material's molecular structure and enhances its absorption rate *in vivo*.⁶ Several reports on its use in pediatric,⁶⁻⁸ gynecological and general surgery⁴ have been published.

This paper reports on the use of IRPG Vicryl Rapide in oral and maxillofacial surgery, both in intraoral and extraoral wounds, and compares this suture material with other commonly used materials and skin closure techniques.

MATERIALS AND METHODS

Seventy-one patients with 80 intraoral wounds closed with IRPG sutures were evaluated. The average patient age was 28.4 years. The patients were evaluated on the day of surgery, then one, seven, 14, 28 and 90 days following surgery. The 71 patients were divided into the following three groups: group 1 consisted of 28 consecutive patients with 34 wounds from elective orthognathic procedures; group 2 consisted of 20 consecutive patients who had stage I dental implant placements; and group 3 consisted of 23 consecutive patients treated for 26 traumatic intraoral lacerations. All patients received perioperative antibiotics — either penicillin G at 2,000,000 units intravenously every six hours, or Cefazolin 1 g intravenously every eight hours for 48 hours. All patients with intraoral wounds were treated with chlorhexidine 0.12% mouth rinse every 12 hours for four weeks.

The results of group 1 were compared with the results of a group of 18 consecutive patients (average age 28.7 years) hav-

ing 24 wounds from elective orthognathic procedures closed with PGLA sutures. The results of group 2 were compared with the results of a group of 22 consecutive patients (average age 24.5 years) receiving dental implants and whose incisions were closed using PTFE Gore-Tex sutures (W.L. Gore & Associates, Flagstaff, Ariz.). In all patient groups, perioperative treatment regimens and follow-up schedules were the same as described above. In a separate portion of the study, 42 patients who had a bicoronal incision for treatment of either facial trauma (22 patients) or forehead lifts (20 patients) were evaluated on the day of surgery, then one, seven, 14, 28 and 90 days following surgery. The average patient age was 38.2 years and the average incision length was 12 cm. One half of the incision was closed using metal staples and the other half using IRPG as a continuing running surface suture. The sides of staple or suture closure were varied randomly. The entire length of each incision had deep, interrupted PGLA sutures. Vacuum suction drains were placed in all cases.

RESULTS

Of the 80 intraoral wounds closed with IRPG sutures, two developed suppuration of the incision line (incidence 2.5%). Both these wounds were successfully treated with a ten-day course of penicillin V at 600 mg taken orally every six hours. Both wounds were traumatic lacerations of the lower lip. There were no cases of hypertrophic scar formation and all sutures had fallen off spontaneously by day 14 (the patients were not aware of the exact disappearance date). In the PTFE patient group, there were no complications but in all cases the sutures had to be removed. All the patients whose wounds were closed with PGLA sutures for orthognathic procedures required some suture removal three to four weeks post-operatively.

There were three cases of suppuration in the PGLA group (incidence 12.5%). There were no cases of suppuration in the 34 wounds closed with IRPG (Table 1). Using the X² test, this difference was found to be statistically significant ($p < 0.05$). In the bicoronal flap study, the following parameters were evaluated: inflammatory reaction, suppuration of wounds, hypertrophic scar formation and patient discomfort, which was evaluated using a visual analogue pain scale and overall patient preference. All patients expressed a preference for the IRPG material, complaining of more pain on the staple side, especially at night when lying in bed. Average pain scores were 6.7 for the staple side versus 1.8 for the IRPG side. Based on the paired *t*-test, the difference is statistically significant ($p < 0.05$) (Table 2).

All staples had to be removed at day 14. All IRPG sutures had fallen out by day 12 in five patients, by day 13 in three patients, and were easily rubbed off on day 14 in 34 patients. All patients had been gently shampooing their hair as directed. There was one case of excessive inflammatory reaction noted on a wound closed with staples. There were no cases of suppuration, alopecia (hair loss) or hypertrophic scar formation in either patient group.

DISCUSSION

IRPG constitutes one more attempt to find an ideal suture material that is strong, handles easily, forms secure knots and causes minimal tissue reaction. Since its introduction in 1976,

this suture has been used with satisfactory results in a variety of applications, including hand, plastic, gynecological, general and oral and maxillofacial surgery.

IRPG has gained particular favour among pediatric surgeons because of its fast absorption rate, which makes suture removal either unnecessary or very simple (sutures can be wiped off). Martelli and others⁸ showed the significant savings in time and money that can be realized by avoiding general anesthesia for very young patients needing suture removal. An added advantage of the IRPG sutures is the very mild inflammatory reaction of the surrounding tissues.^{6,7,9} Microscopically, the suture material is absorbed mainly through phagocytosis and disappears completely by day 35.⁶ The degree of inflammation is less than that observed with plain or chromic catgut sutures. IRPG is not recommended for facial skin closure; it can result in unfavourable scarring by remaining on the surface tissues longer than five days.⁸

The early disappearance of IRPG sutures, compared to PGLA sutures, is another advantage since many patients are irritated by the prolonged presence of intraoral sutures. The PGLA sutures can act as a potential breeding ground for bacteria, especially if sutures are braided, increasing the risk of infection. Finally, removing intraoral PGLA sutures, especially in young patients, can be a difficult and frustrating exercise. With IRPG, suture removal is unnecessary, an added advantage when one considers that many trauma patients are lost to follow-up.

After using the suture material extensively to close a variety of intraoral wounds (incisions for orthognathic surgery, implant placement and lacerations), the authors found this suture easy to handle, providing good knot security and causing minimal inflammatory reaction of the surrounding tissues. As with any new material, there is a learning curve involved with regard to its handling. IRPG is far more brittle than PGLA and will therefore snap if tugged on suddenly, frustrating the novice user. Its regular use, however, requires only a slight adjustment in suturing techniques.

In treating scalp wounds, the authors agree with Tandon and others⁹ that Vicryl Rapide is more visible among the hairs because of its white colour and that it has favourable handling characteristics. It is also preferred by patients because it causes negligible pain and minimal inflammatory reaction compared to staples.

From an economic point of view, Vicryl Rapide is at most 10% more expensive than similarly packaged cut or chromic sutures. PTFE sutures, on the other hand, are at least four times the cost of Vicryl Rapide.

CONCLUSION

IRPG is a versatile and useful suture for oral and maxillofacial surgery. It can be used in a variety of applications, both intra- and extraorally, for pediatric as well as adult patients. The use of IRPG suture results in little wound inflammation. IRPG is absorbed over 12 to 14 days and does not require removal. It is also much more cost-effective than PTFE sutures and only slightly more expensive than catgut, chromic or PGLA sutures. Future evaluations, using clinical and economic parameters, will be necessary to compare IRPG with

newer, absorbable, monofilament polymers such as the polydioxanones and caproclactones. ♦

Dr. Aderriotis is a former senior resident in the department of oral and maxillofacial surgery, faculty of dentistry, University of Toronto. He now is engaged in a private practice in oral and maxillofacial surgery in Athens, Greece.

Dr. S ndor is currently director of the graduate residency training program, oral and maxillofacial surgery, and an assistant professor at the faculty of dentistry, University of Toronto. He is also the coordinator of oral and maxillofacial surgery at the Hospital for Sick Children and the Bloorview MacMillan Centre in Toronto, Ont.

Reprint requests to: Dr. George K.B. S ndor, Department of Dentistry, Hospital for Sick Children, 5527-555 University Ave., Toronto, ON M5G 1X8. E-mail: gsandor@sickkids.on.ca. Fax: (416) 813-6375.

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REFERENCES

1. Smith JW, Aston SJ. *Grab & Smith's plastic surgery*. Boston, (Mass.):Little Brown; 1991. p. 13.
2. Buser D, Bragger U, Lang NP, Nyman S. Regeneration and enlargement of jaw bone using guided tissue regeneration. *Clin Oral Implants Res* 1990; 1:22-32.
3. Anscombe AR, Hira N, Hunt B. The use of a new absorbable suture material (polyglycolic acid) in general surgery. *Br J Surg* 1970; 57:917-20.
4. Herrmann JB, Kelly RJ, Higgins GA. Polyglycolic acid sutures. Laboratory and clinical evaluation of a new absorbable suture material. *Arch Surg* 1970; 100:486-90.
5. Buchnall TE, Ellis H. *Wound healing for surgeons*. Philadelphia, (Pa.):Bailliere-Tyndall; 1984. p. 64.
6. Duprez K, Bilweis J, Duprez A, Merle M. Experimental and clinical study of fast absorption cutaneous suture material. *Ann Chir Main* 1988; 7:91-6.
7. Canarelli JP, Ricard J, Collet LM, Marasse E. Use of fast absorption material for skin closure in children. *Int Surg* 1988; 73:151-2.
8. Martelli H, Catena D, Rahon H, Boukheloua B, Wilcart F, Pelerin D. Skin sutures in pediatric surgery. Use of fast-absorption synthetic thread. *Presse Med* 1991; 20:2194-8.
9. Tandon SC, Kelly J, Turtle M, Irwin ST. Irradiated polyglactin 910: a new synthetic absorbable suture. *J R Coll Surg Edinb* 1995; 40:185.
10. Moy RL, Lee A, Zalka A. Commonly used suture materials in skin surgery. *Amer Fam Physician* 1991; 44:2123-8.
11. Les Tables Rondes Ethicon. Vicryl Rapide suture  rsorption accelere. Ethicon Neuilly, 1993.

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