

# Suture-Related Complications after Penetrating Keratoplasty at King Hussein Medical Center

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## ABSTRACT

**Objective:** To study suture related complications after penetrating Keratoplasty and their role in the success of corneal graft surgery, and to define postoperative management outlines.

**Methods:** The descriptive study was conducted on patients who underwent penetrating Keratoplasty at King Hussein Medical Center in Amman, Jordan between March 2005 and February 2009. It included 75 patients, they were followed for suture related complications during their routine visits, the clinical findings recorded at follow up visits included epithelial erosions around sutures, sterile infiltrates, infectious keratitis, loose or broken sutures, and wound dehiscence after suture removal.

**Results:** Spontaneous loosening or breakage of sutures occurred in 12 patients (16%), at an average of 7 months post surgery. Suture related abscesses were seen in 4 patients (5.3%) at an average of 14 months. Sterile infiltrates were seen in 10 patients (13.3%) at an average of 6 months. Suture erosions over the nylon sutures were found in 6 patients (8 %) at an average of 10 months, while four patients (5.3%) presented with broken sutures and leaking wound at an average of 10 months.

**Conclusion:** Proper postoperative care is important for a successful penetrating keratoplasty. Suture related complications frequently occur after penetrating keratoplasty. Prompt and proper management is essential and will result in earlier visual rehabilitation and greater long-term graft survival.

**Key words:** Penetrating, Keratoplasty, Suture-related complications

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## Introduction

The outcome of corneal transplantation depends on skilled long term care.<sup>(1)</sup> The postoperative course of Penetrating Keratoplasty (PKP) is often complicated by suture-related problems.<sup>(2)</sup> Sutures play an important role in wound stability,<sup>(3)</sup> and their disruption can lead to significant and often unpredictable increase in corneal astigmatism.<sup>(4,5)</sup>

Corneal ulcers, graft rejection and even endophthalmitis had all been reported following suture removal. On the other hand sutures can loosen, become exposed, and serve as nidus for

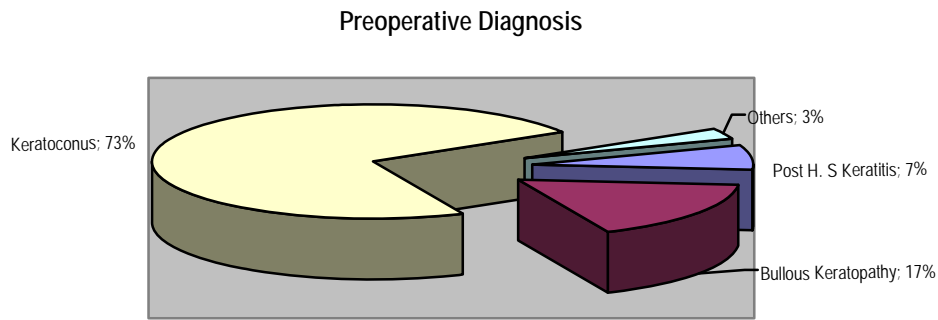
infection. Retained monofilament sutures can cause foreign body sensation, corneal ulcer, tarsal and graft rejection.<sup>(6)</sup>

Our aim is to study suture related complications following PKP and their effect on success of corneal graft surgery, and to define postoperative management outlines.

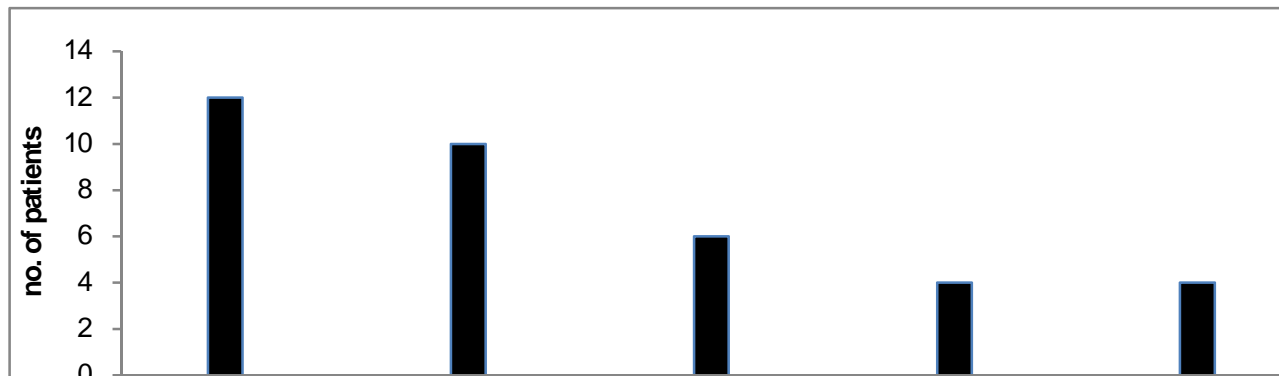
## Methods

This descriptive study was conducted on patients who underwent PKP at King Hussein Medical Center (Royal Medical Services) in Amman, Jordan

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**Fig. 1.** Corneal graft surgery indications



**Fig. 2.** Suture –related complications

between March 2005 and February 2009. It included 75 patients, who were followed up for suture related complications during their routine visits. All surgeries were performed by three expert surgeons using the same procedure and there were no intra-operative complications. All sutures were well buried, with a minimum follow up period of 15 months.

The main indications for grafting were keratoconus followed by pseudophakic bullous keratopathy, herpes simplex keratitis, and corneal dystrophies (Fig. 1).

Patient's pre-operative information included age, sex, systemic disease, lid abnormalities, pre-existing ocular surface disease and corneal vascularization, surgical indications and preoperative medications. Patients were followed up for a minimum of 2 years and the follow-up protocol normally included 12 scheduled examinations in the first year, and 4 examinations in the second year and 6 monthly thereafter.

The clinical findings recorded at follow up visits included epithelial defects around sutures, sterile infiltrates, infectious keratitis, loose or broken sutures, and wound dehiscence after suture removal.

Sutures were not normally removed before 12 months unless they were loose, causing irritation or severe astigmatism by topography.

## Results

Eighty-three eyes of 75 patients were followed up for a minimum of two years. In three patients the PKP was a redo procedure, in four patients cataract extraction was done with Intra Ocular Lens insertion in two of these patients.

An allograft reaction occurred in four patients, two of them presented with sub epithelial dots, the third had Khodadoust endothelial rejection line, while in the fourth patient the rejection was suture related; it was associated with irritating loose suture and early vascularization around the suture, however reversal of the graft rejection was possible in all four patients by increasing the regimen of topical steroid medications as well as a short course of systemic steroids.

The main indication for PKP was keratoconus (n=55), followed by pseudophakic bullous keratopathy (n=13), herpes simplex corneal opacity (n=5), and other causes (n=2) as shown in Fig. 2.

**Table 1.** Post-operative time interval of suture related complication following keratoplasty

Complication	No.	%	Average time (months)	Range (months)
Loose irritating sutures	12	16	7± 5.16	1-15
Sterile infiltrates	10	13.3	6± 2.58	2-9
Erosions	6	8	10± 4.69	2-15
Suture Abscess	4	5.33	14± 10.73	7-30
Traumatic wound dehiscence	4	5.33	10± 5.56	9-15

Spontaneous loosening or breakage of sutures occurred in 12 patients, two of them required re-suturing due to early wound dehiscence or manifest leakage from the wound. The average time interval between PKP and the occurrence of breakage was seven months (SD±5.16, range 1-15 months) (see Table I).

Suture related abscesses were also seen in four patients, they came complaining of pain and injected eyes. Two of them had ulcerative epithelial defects with stromal infiltrates adjacent to loose irritating sutures while the other two presented with infiltrates and hypopyon one week following selective suture removal. All patients were cultured, the results revealed *Streptococcus pneumoniae* in two patients, *Staphylococcus aureus* in one patient, and no growth in the fourth patient; this however was considered infectious because of the presence of hypopyon and good response to fortified topical antibiotic treatment. The average time between surgery and occurrence of abscesses was 14 months (SD±10.73, range 7-30 months).

Three of these patients were admitted to hospital; all were treated with daily sub-conjunctival injection of antibiotics for four days and vigorous topical fortified eye drops and responded well.

One of the patients developed endophthalmitis and received intravitreal antibiotic injection and also responded well but experienced a decrease of two lines of visual acuity.

Sterile infiltrates were found in 10 patients (13.3%), mostly as small sub-epithelial infiltrates adjacent to sutures more often on the recipient side. All were symptom free and only were detected at routine follow up visits. Close observation was necessary and none of them progressed to ulcers or abscesses and therefore no culture and sensitivity tests were performed.

These infiltrates were encountered at an average of 6 months post PKP (SD±2.58, range 2-9 months), most of infiltrates disappeared over the follow up course.

Suture erosions over the nylon sutures were also recorded in six patients (8%) throughout the post

operative follow-up period at an average of 10 months (SD±4.69, range 2-15 months). Patients reported a foreign body sensation, the eroding sutures were removed and broad spectrum topical antibiotics were prescribed with close follow up and symptoms disappeared with no sequel on vision.

Three patients presented with broken sutures and leaking wound following trauma, this incidence occurred in keratoconus young patients with age range 13-18 years; however one other patient with graft following pseudophakic bullous keratopathy developed wound dehiscence following suture removal 12 months after surgery, average time from surgery was 10 months (SD±5.56, range 5-8 months).

## Discussion

In our study, 6 patients developed suture erosions within an average time of 10 months (±4.69) post surgery, this finding was inconsistent with previous studies published by Dana *et al.* who reported 33 months,<sup>(7)</sup> and Siganos *et al.* who reported 31.6 months.<sup>(8)</sup> This finding is probably related to our policy of removing all sutures between 12-18 months post surgery; as the suture erosion tends to escalate with increased elapsed time from surgery, especially beyond the two year postoperative period.<sup>(7)</sup>

Suture abscesses occurred at an average of 10 months, this goes with average time reported by Tseng *et al.*<sup>(9)</sup> of 10.4 months, and 8.6 months according to Huang *et al.*; however suture related abscesses were reported at 21.5 months post surgery according to Leahy *et al.*,<sup>(11)</sup> and 27.1 months in the study conducted by Sanchez-Perez *et al.*<sup>(12)</sup> The micro organisms reported in the studies performed by Leahy *et al.*<sup>(11)</sup> and Christo *et al.*<sup>(2)</sup> were similar to species found in culture results of our study.

Broken or loose sutures in need for repair occurred only in one patient as it occurred in the early post-operative period; while the patients who presented with loose irritating sutures did not need intervention, because they occurred later in

postoperative course, and the tensile strength of the wound was good.

Wound dehiscence after suture removal occurred in one patient (1.3%) while in his study Christo *et al.*<sup>(2)</sup> reported nine cases (2.5%). Post traumatic wound dehiscence occurred in three patients which was also reported by Lam *et al.*<sup>(13)</sup> they were caused by assault in two patients and due to accidental falling down in the third patient. Wound dehiscence is a cause for concern as corneal wounds almost never regain the original strength of the original graft even several years after meticulous repair.<sup>(13)</sup>

Corneal infiltrates were found in 13.3% of patients at an average of six months, this goes with Brady's findings,<sup>(14)</sup> who described suture related immune infiltrates in the early post-operative period. They were multiple, mostly on host side of the graft-host interface with no overlying epithelial defect, and so they were not cultured.

It seems a good policy to remove the sutures between 12-18 months post PKP surgery, as it helps quick rehabilitation and the use of contact lenses with minimal suture related complications. The frequency of keratoplasty suture erosions and the serious morbidity associated with them dictates that the long term retention of these sutures should be recognized as a risk factor for the development of postoperative infection.<sup>(7)</sup>

In reviewing patients included in our study, loose irritating sutures necessitating removal and suture related infiltrates which need close follow up were the most common presenting suture related complications. These clinical conditions should not be ignored, as delay in management may result in sight threatening complications.

## Conclusion

Proper postoperative care is critical for successful PKP. The anticipation of post operative complication in patients is important, and preventative measures should be taken. When complications do occur, prompt and proper management is essential, this will ensure earlier visual rehabilitation and greater long-term graft survival.

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