Shaving the Surgical Site and Infection in Lumbar Spine Surgery

Mazin S. Mohammed Jawad

ABSTRACT:

BACKGROUND:

Spine surgeons ordinarily shave the skin of the surgery locality before operation start. Nevertheless, data from some surgical series proposes that preoperative shaving may enhance the post-surgical infection incidence.

OBJECTIVE:

To conclude whether shaving the surgical site before lumbar spine surgery induces infection in the post-operative period and whether presurgical shaving is compulsory.

METHODS:

A prospective cohort study had conducted over two years at the Department of neurosurgery, Medical City, Baghdad, Iraq, starting from July 2018. A total of 186 patients scheduled to undergo spinal surgery were randomly allocated into 2 groups: those in whom the site of operation was shaved immediately before surgery (shaved group; 90 patients) and the patients in whom presurgical shaving was not performed (unshaved group; 93 patients). The mean duration of anesthesia and the infection rates in both groups were recorded and compared.

RESULTS:

The span of anesthesia did not deviate in the two assemblies ($P > .05$). Postoperative infection occurred in 9 patients in blade shaved group, 4 of them underwent Lumbar disc surgery ($P < .01$).

CONCLUSION:

The shaving of the incision site immediately before lumbar spinal surgery using blade may increase the rate of post-operative infection.

KEYWORDS: antibiotic prophylaxis, lumbar disc, shaving, spine surgery, wound infection.

INTRODUCTION:

Most patients undergoing neurosurgical procedures dread the commonly performed preoperative hair removal. Notwithstanding, numerous neurosurgeons order removing the patient's hair before surgery. They claim that this routine prevents postoperative infections. Furthermore, they claim that preoperative hair removal promotes precise preparation of the incision, attachment, removal of the drapes, plus closing of the wound.(1) Nonetheless, since the 1980s, many articles have been issued explicating that preoperative shaving may increase the hazard of postoperative infections due to a shift or loss of shielding skin flora or bacterial colonization of the shaved area provoked by the razor-induced abrasions and microtrauma as Staphylococcus aureus present on the hair of about 10% of people having no hospital contact and on that of about 50% of patients with skin diseases.[1] Furthermore, this can result in a higher treatment costs and prolonged hospitalization.(2)

Hair removal can potentially jeopardize the skin barrier that creates a portal of entry for skin micro-organisms, some of the most common pathogens associated with nosocomial infections.(3,4) A prospective research of 62,939 wounds conducted by Cruse and Foord over a decade illustrated that the lowest risk of surgical wound infection correlated with no preoperative hair removal. That deposited the basis for credentials from the Centers for Disease Control and Prevention, Association for Perioperative Registered Nurses, and the National Institute for Health and Care Excellence (NICE) that perioperative hair removal not to be executed unless the hair at or around the incision site will conflict with the surgical procedure.(5)

Department of Neurosurgery, Al-Imamein Al-Kadhemein Medical City, Baghdad, Iraq.

Analysis has attested that razor shaving produces micro-abrasions in the skin, enabling skin-dwelling micro-organisms to proliferate.[3,4] These micro-organisms can next migrate into the incision locality, inducing surgical wound infections.[6]

Attempts to lessen the rate of surgical wound infections have resulted in several modifications to the practice of preoperative hair removal. Evidence has led to new recommendations from professional organizations such as the Centers for Disease Control and Prevention (CDC) and the Association of preoperative Registered Nurses (AORN) as well as accrediting bodies such as The Joint Commission (TJC) and Centers for Medicaid and Medicare Services (CMS). While all of these groups have concluded that hair at the surgical site to leave in place whenever possible, the practice of hair removal continues to be undertaken in many surgeries and not always following guideline recommendations.[7]

Surgical site hair removal also has notable logistical implications for operative theatre efficiency when performed in the operative theatre. Room set up, including preparing the patient and instrument table, must be delayed until hair clean-up finished. A survey of AORN members reported that the average amount of time devoted to hair clean-up was 4.1 minutes per case. [7] With one minute of operating room time costing an average of $62 (range $22-$133)/£20-£24.77) according to several reports, the cumulative cost of that clean-up time over the course of a day could be considerable. [8]

PATIENTS AND METHODS:

This planned clinical study incorporated 186 subjects who sustained spinal surgery from July 2018 through July 2020. All patients had acquainted meticulously concerning the current scientific work, and each afforded signed informed permission. The patients had randomly allocated in a 1:1 proportion on a randomization sheet about preoperative shaving status: The assemblage shaved ere surgery composed of 90 cases, and those not shaved consisted of 93 patients. Shaving done by razor (45 cases) and clipper (45 cases), time of shaving was immediately before surgery prior to skin scrub. There is variance among groups emerged from the unfinished follow-up period of 3 shaved patients and omitted from study. The demographic attributes of patients manifest in Table 1. The subjects studied experienced operation on the lumbar spine region. Patients hold suboptimal skin ailments such as acne, sebaceous cyst, or a hairy nevus omitted from the research. Furthermore, neither nutritional or immune deficiency nor smokers had included in the study. The protocol of preoperative skin preparation applies in both groups, and all surgeries perform by the same surgical team. The mean span of surgery for the subjects studied was 58.3 ± 16.1 minutes in the shaved group and 60.2 ± 17.2 minutes in the unshaved group.

In the operative theater, after patient placement and anesthesia receive, a soft sponge was handled to scrub the skin surface for 10 minutes with a 7.5% povidone-iodine soap solution diluted 50% with water without the use of Brushing. The skin at the site of operation was thoroughly dried with sterilized sheets, rinsed with a 10% povidone-iodine solution, and then draped. For the shaved group, the skin at the site of operation was shaved with a razor, scrubbed, and draped. All cases received intravenous ceftriaxone within an hour before and for 73 hours after surgery. Subjects in whom infection contracted endured those antibiotics in double doses until the results of culture and sensitivity receive. Closure of the fascia and skin achieved with an absorbable braided suture (polyglactin 910), and consideration was exerted not to catch hair in the surgical incision.

Infection diagnosed when either of the following signs or symptoms emerged: a purulent exudation from the operative wound; progressing pain, tenderness, or redness encompassing the incision line in addition to blood test results attesting a high polymorphonuclear lymphocyte number or an elevated erythrocyte sedimentation rate; clinical hallmarks of meningitis; or an abscess identified via control magnetic resonance imaging studies and the results of hematologic tests. Exclusion criteria are history with an allergy or hypersensitivity to antibiotics, patients who had sustained operation in the month before their spinal intervention, and the administration of an antibiotic within one week before their surgery. Data about the state of the wounds and the presence of infection assembled continuously.

The data expressed as the mean ± SEM. The Student's T-test (Which is one of the most commonly used techniques for testing a hypothesis on the bases of a difference between sample means) had used to analyze the infection rates in both assemblies. Statistical significance had

appropriated at an error likelihood of P < .05. Analyses had performed with SPSS 20 software.

RESULTS:

The mean span of anesthesia for the subjects studied was 58.3 ± 16.1 minutes in the shaved gathering and 60.2 ± 17.2 minutes in the unshaved group (P > .05). The proportion of complex spinal operations, such as those for the treatment of spinal stenosis, the excision of a tumor, or the placement of instrumentation, was significantly more eminent in the unshaved group than in the shaved one (P < .05).

Table 1:The demographic characteristics of patients.

	Non-shaved Group	Blade Shaved Group	Clipper Shaved Group
Gender (Female/Male)	49/44	26/19	20/25
Mean age (years)	40±7	42±11	47±3
Surgical intervention	Incidence of wound infection (Number of patients)		
Lumbar disc herniation	1/36	4/18	0/16
Lumbar posterior instrumentation	0/11	2/7	0/8
Lumbar spinal stenosis	0/21	2/11	0/5
Lateral recess syndrome	0/17	1/4	0/7
Spinal tumor	0/8	1/5	0/9
Total	93	90	

Postoperative wound infection (within 1st month) occurred in ten patients, all except one were in the shaved assembly with blade, four patients, of whom had experienced lumbar disc surgery. Nine of those individuals had a superficial skin and subcutaneous tissue infection. The culture showed that five of those nine patients had a methicillin-resistant Staphylococcus aureus infection (MRSA) and that three possessed a Staphylococcus Epidermidis infection and in one patient the results of the culture are negative (no bacterial growth). In those nine subjects, reoperation not in need. Antibiotics deliver according to the results of culture and sensitivity, and surgical site debridement achieve.

The tenth subject in that assemblage had an infection with an abscess in the intervertebral space, but the results of the culture are negative (no bacterial growth). That patient experience surgery to drain the abscess, clean infected disc fragments, and guarantee efficient debridement. The remedy was accomplished with bed rest and prolong ceftriaxone regimen. A superficial wound infection occurred in only one patient in the unshaved group. The results of culture in that subject, who improved after antibiotic treatment and debridement of the surgical site, unveiled Acinetobacter baumannii. The infection incidence in both assemblages was statistically significant (P < .01), and that finding firmly submitted an affiliation amidst preoperative shaving and the infection rate. Oppositely, not shaving the site of operation did not hinder the performance of the surgical procedure in either mean.

DISCUSSION:

Although the number of studies on shaving in spine surgery is limited, several randomized controlled studies show that shaving results in a significantly higher percentage of postoperative wound infections.[1]

No statistical difference regarding the span of anesthesia and impact on wound infection in our study between the shaved and non-shaved gatherings (P > .05) and this attributed to the standardization of anesthesia protocol for our patients including anesthetic medications dosage, and this in concordance with the study by Celik and Kara[2] in their randomized controlled trial were they controlled internal validities such as duration of anesthesia.

Our study shows gender male prevalence regarding postoperative infection in shaved assembly (P < .01) that can be explained by coarser and dense hair in male patients compared to female counterparts, also more preponderance of skin abrasions by the blade and denser concentration of skin flora. On the other hand, Maksimvic et al. [2] conducted a prospective cohort study to identify the incidence rate and risk factors for surgical site infections in spine surgery. The assessment result was that 63 out of 277 patients developed an infection with slight female preponderance,

such a high infection rate attributed to higher female cases with comorbidities like diabetes mellitus and autoimmune diseases.

In the current study, infection during the postoperative period happened with shaving by razor just before surgery. Razor causes micro-abrasions and disruption of skin coverage leading to the introduction of pathogens into the surgical wound as hair removal happen in the time just before incision. An opposing Cochrane review included quasi-randomized controlled trials concerning hair removal on postprocedural infection rates after spinal surgery.[9] Included in this review were studies comparing hair removal with no hair removal, hair removal by different methods, and times before surgery. The data of the controlled trials that appraise hair removing showed no significant differences in rates of postprocedural infection, so agonizing the findings of our study. Other findings of this review were that preoperative hair shave, resulted in more postoperative infections than preoperative hair clipping.

In 2013 a literature review that has similar results as our study was published to investigate relationships between preoperative hair removal and postoperative surgical site infections [10]. It included several separately appraised studies. The first was a randomized controlled trial involving 789 patients who had lumbar spinal surgery done by the same surgeon [2]; they were randomized to two groups to compare preoperative razor shaving with no hair removal; the finding was that razor shaving increased the risk of postoperative infection. The second study in this review was also an randomized controlled trial. Shaved patients have a much higher rate of postoperative infection.[4] The third of these five studies was an randomized controlled trial comparing preoperative shaving and hair removal by electric clippers.[3,11] The data showed that shaving was associated with more than twice the number of postoperative infections than hair clipping.[12,13]

Wound cultures at our study showed Staphylococcus aureus and Staphylococcus Epidermidis infection both are normal skin flora. Acinetobacter baumannii cultured in one patient who received steroid therapy after recent cardiac pacemaker placement. What explains such a culture is the predilection of Acinetobacter in patients with a compromised immune system.

Our study goes with other literature that the most common causative organisms were methicillin-sensitive Staphylococcus aureus and methicillin-resistant *S.* aureus ($P < .01$). [14,15]

The type and dosage of the prophylactic antibiotic regime in the prevail study at which the drug administration is similar to those in preceding studies that reached the wanted outcome from antibiotic prophylaxis. [16,17,18]

CONCLUSION:

Our results showed that not shaving the incision site may actually protect against postsurgical skin infection in patients who have undergone lumbar spinal surgery. It strongly suggests that preoperative shaving is unnecessary and needs more detailed prospective studies.

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