Original Article

Treatment of Ocular Surface Squamous Neoplasia with Interferon Alpha-2b

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Purpose: To study the efficacy and safety of Interferon (IFN) alpha 2b for Ocular Surface Squamous Neoplasia (OSSN).

Study Design: Quasi experimental Study.

Place and Duration of Study: Mayo Hospital Lahore, Lahore General Hospital, Armed Forces Institute of Ophthalmology, Rawalpindi, Pakistan October 2010 to August 2016.

Material and Methods: Patients with suspected conjunctival growth underwent incisional biopsy. Ninety-one eyes of 88 patients were included in the study. The patients with suspected conjunctival growths underwent incisional or excisional Biopsy +/- cryotherapy. After confirming the diagnosis of Ocular Surface Squamous Neoplasia (OSSN), on histopathology, cases were inducted in the study. Intralesional/peri-lesional Interferon (IFN) Alpha-2b was given to the patients weekly along with interferon Alpha-2b topical drops four times daily, for three months. These patients were followed-up in respective hospitals and examined for resolution or recurrence of lesion for atleast three (03) months.

Results: Out of 88 patients, 29 were females and 59 were males. The age of the patients was between 52 to 76 years. Eighty eyes tolerated and responded well to the treatment. There was recurrence in 08 eyes, which had advanced squamous cell neoplasia. Three patients were lost to follow up. Mean resolution time of tumor was 3 months and mean follow up time was 12 months with range of 3 months to 5 years. The side effects recorded in our study were filamentary keratitis, conjunctivitis and pyogenic granuloma.

Conclusion: For the management of Ocular surface squamous Neoplasia IFN alpha 2 b is safe and effective choice with low recurrence rates.

Key Words: Conjunctival squamous cell carcinoma, Conjunctival intraepithelial neoplasia (CIN), Ocular surface squamous neoplasia (OSSN), Interferon alpha-2b.

Ocular surface squamous neoplasia encompasses a broad spectrum of neoplastic abnormalities which include squamous dysplasia, squamous cell carcinoma in situ, and invasive squamous cell carcinoma. Squamous cell carcinoma of the conjunctiva includes neoplastic abnormalities that may cause severe morbidity to the patients. It is the third most common conjunctival malignancy worldwide and is commonest in dark-skinned, Caucasians and in tropics[1].Itsincidence is 37.3 per million eyes with ocular tumors[2]. Thorough clinical assessment and early diagnosis is the key for preventing the visual loss and morbidity in patients. Persons in the older age group, those who have UV-light exposure and are smokers have increased risk of developing ocular surface squamous neoplasia. Recurrence rate after surgical excision within 2 years is 15-52% and associated with tissue disruption enhancing the ability of tumor cells to enter in the eye. Previously, mitomycin-C and 5-fluorouracil have been

used with very good results but the complications associated with these drugs have alarmed the physicians[5]. The complications include uveitis, epithelial erosions, ulceration, and glaucoma. Recent advances suggest use of Interferon-2b for treating these neoplasms[6,7,8]. Interferons are glycoproteins that bind to cell receptors, and trigger effector proteins that inhibit viruses, activate immunocompetent cells and regulate oncogenes. Interferon **α**-2b is a recombinant form that has been used for hepatitis B/C, malignant melanoma, follicular lymphoma, condylomaaccuminatum, Kaposi's sacrcoma, multiple myeloma, and hairy cell leukemia. The standard dose of topical interferon **α**-2B is 1M IU/ml. Median age for the complete tumor resolution was three months. Few adverse effects of interferon **α**-2b are reported as photophobia, follicular conjunctivitis, conjunctival hyperemia with foreign body sensation and pyogenic granuloma. However, stillit is better tolerated than the other forms of topical therapies.

Rationale of the study was to analyze non-surgical treatment of OSSN. Topical interferon alpha-2b therapy can be used to treat OSSN (Immuno-therapy) as well as to reduce the size of OSSN (Immuno-reduction) prior to excision. It may avoid the morbidity of excision that includes loss of limbal stem cells or scarring of ocular surface. The purpose of the study was to find the efficacy and safety of topical and intra-lesional Interferon (IFN) **α**-2b for Ocular Surface Squamous Neoplasia (OSSN) in Pakistani population.

MATERIAL & METHODS

This was a Quasi experimental study, which was conducted in Mayo hospital/KEMU Lahore, Armed Forces Institute of Ophthalmology, Rawalpindi and Lahore General Hospital, Pakistan from October 2010 to August 2016. Total Sample size of 90 patients was estimated by using 95% confidence level, 10% absolute precision with expected percentage of Ocular surface squamous neoplasia as 91.6%.

$n = (Z_{1-\alpha/2})^2 \times P \times q / d^2$

$Z_{1-\alpha 2}$ = Confidence level 95% = 1.96

P = Prevalance 91.6%

q = 1-P

d = Absolute precision 10%

Non-probability purposive sampling was done. The patients with suspected conjunctival growths underwent incisional or excisional Biopsy +/- cryotherapy. After histological confirmation of Ocular Surface Squamous Neoplasia (OSSN) the case was included in the study. Patients with all other forms of growths and patients with previous history of OSSN were excluded from the study. All the pre- and post-operative data was recorded on a Proforma. Intra-lesional/peri-lesional IFN **α**-2b was injected weekly with a dose of 3 million IU along with interferon **α**-2btopical drops qid (1 MIU) until the resolution of tumor. The drug was aspirated using a sterile syringe and transferred into an emptied bottle of the artificial tears. The bottle was kept refrigerated until used.

Only those cases that completed at least 3 months follow-up after the resolution or recurrence of lesion were included. Descriptive statistical results like frequency and percentage was calculated by using SPSS Version 21.

RESULTS

Ninety-one eyes of 88 patients were included in study. Out of these, 29 were females and 59 were males. The age of the patients was52-76 years (Mean 64years). Eighty eyes tolerated and responded well tothe treatment and got cured. There was recurrence in 08 eyes (9.2%), all of which had advanced squamous cell neoplasia. Three patients were lost to follow up. Mean resolution time of tumor was 3 months and mean follow up time was 12 months with range of 3 months to 5 years.

The resolution time is shown in Fig-1. The side

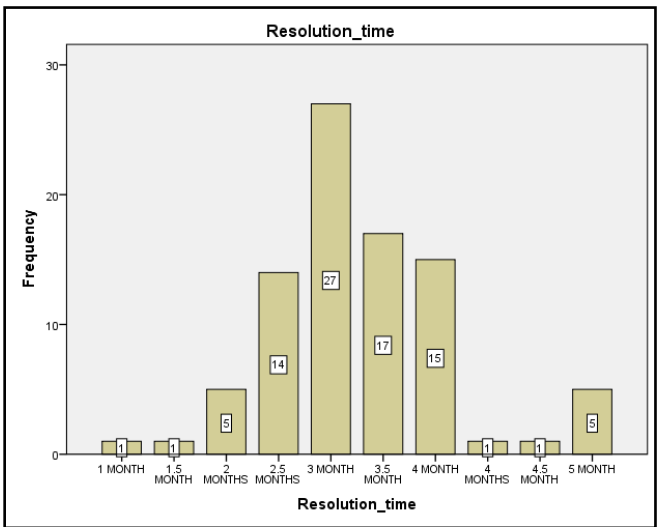

Fig. 1: Resolution Rate.

effects recorded in our study were filamentary keratitis (1 patient), conjunctivitis (2 cases) and pyogenic granuloma (2 cases). Most of these resolved with lubricants. However, the pyogenic granulomas needed excision under local anesthesia.

DISCUSSION

Ocular surface squamous neoplasia is the most common malignancy in elderly patients, resulting in severe ocular damage and visual impairment. We note that mean age of our study population was a bit younger than those of Caucasian population.

Any lesion that is epithelial in origin mostly grows at the limbus, because normal epithelial cellular activity is maximum at limbus[9]due to the presence of Limbal Stem Cells.

The squamous cell carcinoma incidence varies from 0.02 to 3.5 per 100,000[10]. In Conjunctival intra-epithelial neoplasia (CIN/Bowen's disease), basement membrane is not breached and lesion is involving epithelial membrane only. If the tumor cells invade the basement membrane and involve the sub-epithelial tissues, it is called Squamous cell neoplasia.

Histological spectrum of squamous cell carcinoma includes; micro-invasive, invasive, poorly differentiated and spindle cell. Conjunctival and corneal surface can be involved with tumor, showing dysplastic changes in epithelium from mild to moderate grade, and also of infiltrative variety.

Previously, tumor was treated with excision leaving 2-3 mm tumor free margins, and cryotherapy was applied for the prevention of recurrence[11]. Still, patients showed recurrence rate of 6–30% with negative margins and up to 55% with positive margins[12]. A study from Victoria (Australia) reported death of 8% cases due to metastasis, despite orbital exenteration for invasive OSSN[13]. In 18 patients reported from Pakistan, 42% needed exenteration even after aggressive treatment of this tumor[14].Therapy with antimetabolite agents like Mitomycin C, 5-Fluorouracilhas been effective in treating the small lesion and can be given as adjunctive therapy following excision[5] but have higher rate of recurrence.

On the other hand, recurrence rates after topical or injected interferon alpha-2b are between 1% and 28%[15,16] with follow-ups ranging from 2 to 28 months, which is much lower. Our study also showed a similar recurrence rate (8.7%). Interferon **α**-2B has proven beneficial in small sized localized lesions, large diffuse lesions and partially excised ocular surface neoplasia, as well as in recurrent disease (Immunotherapy)[15]. Analysis of 36 studies were published by Siedlecki et al[16]and they concluded that excision of OSSN with positive margins followed by topical Interferon**α**-2B is the best strategy to reduce recurrence or persistent disease. In diseases that include extensive involvement of ocular tissues, interferon as**α**-2b can be used to reduce the size of the tumor (Immuno-reduction) so that after excision there is less bare surface and lesser complications[17].

Mitomycin-C, can result in corneal epitheliopathy, corneal ulceration, dry-eye, uveitis and glaucoma. It has to be used as a tedious"on andoff" regimen, to prevent the complications associated with its continuous use[12,17].

With the use of topical Interferon **α**-2b we came across very few side effects as compared to other agents[18]. The side effects we came across in our study were filamentary keratitis, conjunctivitis and pyogenic granuloma formation, which were managed effectively. Most of the time these resolved with lubricants, though pyogenic granuloma needed excision. The major benefit of Interferon topical therapy is, that it obviates the need of wide surgical excision.A study[19] comparing the quality of life in excision versus Interferon**α**-2bresulted in similar outcomes.

This topical medication is not available commercially in Pakistan hence, the drops had to be dispensed in a sterile eye drops bottle. Patients should be counseled about refrigeration and compliance of the therapy. The limitation in our study was a smaller population.

CONCLUSION

Intra-lesional and perilesional Interferon **α**-2b along with topical drops is a better option for the treatment of ocular surface squamous neoplasia (OSSN) in our population. Future studies are needed to determine the long-term effects.

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