Radiotherapy and Oncology 139 (2019) 79–82

Contents lists available at ScienceDirect

Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com

Short Communication

A randomized trial (RAREST-01) comparing Mepitel® Film and standard care for prevention of radiation dermatitis in patients irradiated for locally advanced squamous cell carcinoma of the head-and-neck (SCCHN)

Dirk Rades [a,*], Carlos A. Narvaez [a], Laura Splettstößer [a], Claudia Dömer [a], Cornelia Setter [b], Christian Idel [a,c], Julika Ribbat-Idel [d], Sven Perner [d,e], Tobias Bartscht [f], Denise Olbrich [g], Steven E. Schild [h], Jesper Carl [i]

[a] Department of Radiation Oncology, University of Luebeck; [b] Department of Radiation Oncology, Christian-Albrechts University Kiel; [c] Department of Radiation Oncology and Department of Oto-Rhino-Laryngology and Head and Neck Surgery, University of Luebeck; [d] Institute of Pathology, University Hospital Schleswig-Holstein, Luebeck; [e] Pathology, Research Center Borstel, Leibniz Lung Center, Borstel; [f] Department of Hematology & Medical Oncology, University of Luebeck; [g] Centre for Clinical Trials Luebeck, Germany; [h] Department of Radiation Oncology, Mayo Clinic, Scottsdale, USA; [i] Department of Oncology & Palliative Units, Zealand University Hospital, Naestved, Denmark

ARTICLE INFO

Article history:
Received 16 May 2019
Received in revised form 16 July 2019
Accepted 16 July 2019
Available online 17 August 2019

Keywords:
Head-and-neck cancer
Radiation dermatitis
Randomized trial
Mepitel® Film
Standard care

ABSTRACT

Mepitel® Film (MEP) and standard care (STD) were compared for radiation dermatitis in SCCHN patients. This trial was stopped prematurely since13/28 patients did not tolerate MEP. Grade ≥2 dermatitis: 34.8% (MEP) vs. 35.7% (STD) at 50 Gy, 65.2% vs. 59.3% at 60 Gy. MEP was unsatisfactorily tolerated and appeared not superior (NCT03047174).

Most patients with locally advanced SCCHN receive radiotherapy, which can be associated with significant toxicity including radiation dermatitis [1,2]. Grade 3 radiation dermatitis [8] may force physicians to interrupt radiation treatment, which can impair the patients' prognoses [3–5]. To avoid grade ≥3 radiation dermatitis, grade 2 dermatitis [3] should be avoided or postponed.

In previous studies of radio(chemo)therapy for locally advanced head-and-neck cancer, grade ≥2 dermatitis was observed in 86–92% of patients, despite standard skin care [1,6,7]. A randomized trial showed promising results with Mepilex® Lite, a self-adhesive dressing, in patients with moist dermatitis during radiochemotherapy for nasopharynx cancer [8].

In a randomized trial, prophylactic use of Mepitel® Film, a more recently developed dressing reduced the severity of skin reactions in breast cancer patients [9]. The present RAREST-01 trial compared Mepitel® Film to standard skin care for prevention of grade ≥2 radiation dermatitis in patients with locally advanced SCCHN [10].

Patients and methods

This randomized, active-controlled, parallel-group multicenter trial compared Mepitel® Film (MEP) and standard skin care (STD) for prevention of moderate and severe radiation dermatitis in patients receiving radio(chemo)therapy for locally advanced SCCHN [10]. It was approved by local ethics committees (leading committee: University of Lübeck, reference AZ 16–124), conducted in accordance with the Declaration of Helsinki and registered at clinicaltrials.gov (NCT03047174). Criteria for inclusion and exclusion have been reported before [10].

Patients were stratified according to center, tumor site (oropharynx/oral cavity vs. hypopharynx/larynx) and treatment (radiotherapy vs. radiochemotherapy). In addition, several characteristics were assessed (Table 1).

Radiotherapy and radiochemotherapy

Radiotherapy was performed as conventionally fractionated (5x2.0 Gy/week) volume modulated arc therapy (VMAT). Target volume up to 50 Gy included primary tumor region and bilateral cervical and supraclavicular lymph nodes. Sequential boosts were

* Corresponding author at: Department of Radiation Oncology, University of Lübeck, Ratzeburger Allee 160, D-23562 Lübeck, Germany.
E-mail address: rades.dirk@gmx.net (D. Rades).

https://doi.org/10.1016/j.radonc.2019.07.023
0167-8140/

Table 1
Patient characteristics of the treatment group (Mepitel® Film, $n = 28$) and the reference group (standard skin care, $n = 29$).

	Mepitel® Film *N* patients (%)	Standard skin care *N* patients (%)
Age		
≤62 years	15 (53.6)	14 (48.3)
≥63 years	13 (46.4)	15 (51.7)
Gender		
Female	6 (21.4)	5 (17.2)
Male	22 (78.6)	24 (82.8)
Tumor site (all sites)		
Oropharynx	13 (46.4)	11 (37.9)
Oral cavity	4 (14.3)	6 (20.7)
Hypopharynx	5 (17.9)	7 (24.1)
Larynx	6 (21.4)	5 (17.2)
Tumor site (stratification)		
Oropharynx/oral cavity	17 (60.7)	17 (58.6)
Hypopharynx/larynx	11 (39.3)	12 (41.4)
Tumor stage (AJCC)		
Stage II	3 (10.7)	2 (6.9)
Stage III	7 (25.0)	7 (24.1)
Stage IV	18 (64.3)	20 (69.0)
Histologic grading		
G 1–2	17 (60.7)	16 (55.2)
G 3	9 (32.1)	12 (41.4)
Gx	2 (7.1)	1 (3.4)
HPV status		
Negative	18 (64.3)	16 (55.2)
Positive	8 (28.6)	10 (34.5)
Unknown	2 (7.1)	3 (10.3)
Treatment regimen (stratification)		
Radiotherapy alone	6 (21.4)	7 (24.1)
Radiochemotherapy	22 (78.6)	22 (75.9)
Chemotherapy given (at least one course)		
Cisplatin	15 (71.4)	14 (66.7)
Carboplatin	6 (28.6)	5 (23.8)
Mitomycin C + 5-Fluorouracil	0 (0.0)	2 (9.5)
Surgery performed		
No	13 (46.4)	15 (51.7)
Yes	15 (53.6)	14 (48.3)
Extent of resection		
R0	11 (73.3)	13 (92.9)
R1	3 (20.0)	0 (0.0)
Rx	1 (6.7)	1 (7.1)
Neck dissection performed		
No	1 (6.7)	0 (0.0)
Unilateral	9 (60.0)	10 (71.4)
Bilateral	5 (33.3)	4 (28.6)
Contributing center (stratification)		
University of Luebeck	26 (49.1)	27 (50.9)
Christian-Albrechts University Kiel	2 (50.0)	2 (50.0)

assigned depending on treatment approach, extent of resection and extra-capsular extension of lymph node metastasis [10].

Clinical (CTV) and planning (PTV) target volumes were retracted from the skin by 2 mm. For patients included in this study, no bolus was used. In contrast to other organs at risk, the skin was not included in the optimization process of VMAT. In patients receiving concurrent chemotherapy, cisplatin was the first choice (2 courses of 20 mg/m2/d1–5 or 25 mg/m2/d1–4). In case of impaired renal function, two courses of carboplatin (AUC 5–6) or mitomycin C (10 mg/m2/d1) plus 5-fluorouracil (1000 mg/m2/d1–5) were allowed. Carboplatin was given for the second course, if renal function decreased during or after cisplatin.

Skin care

In the treatment group, Mepitel® Film (MEP) was started on the first day of radiotherapy and continued until grade ≥2 moist desquamation or grade ≥3 radiation dermatitis occurred, otherwise until one week following radiotherapy. Grade ≥2 moist desquamation and grade ≥3 radiation dermatitis were treated with antiseptic agents followed by silicon or calcium alginate bandage until moist desquamation disappeared and/or radiation dermatitis improved to grade 2. MEP was changed twice per week. Since the film was transparent, the fact that it was not changed daily had no impact on the assessment of radiation dermatitis including desquamation.

In the reference group, standard skin care (STD) was started on the first day of radiotherapy including fatty cream with 2–5% urea (fatty cream alone if patients did not tolerate urea) and mometasone furoate cream. STD was continued until grade ≥2 moist desquamation or grade ≥3 radiation dermatitis occurred or until one week following radiotherapy. For these reactions, the same treatments were administered as in the treatment group.

Endpoints and assessments

Primary endpoint was grade ≥2 radiation dermatitis (CTCAE v4.03, [3]) at 50 Gy. Secondary endpoints included grade ≥2 dermatitis at 60 Gy, number of fractions up to 50 Gy till grade ≥2 dermatitis, and pain at irradiated skin.

Radiation dermatitis and pain at irradiated skin (self-rating scale from 0 to 10) were assessed from the first day of radiotherapy, prior to each radiation fraction, and up to three weeks following radiotherapy [3].

Statistical considerations

Primary goal was to demonstrate superiority of MEP over STD in preventing grade 2 radiation dermatitis at 50 Gy. Details regarding sample size calculations have been reported previously [10]. Eighty patients were required for each group. Assuming that 5% of patients would not qualify for the analyses, 168 patients were planned to be randomized.

Interim analysis

To evaluate the tolerance of the Mepitel® Film treatment, an interim analysis was conducted after 57 patients. Recruitment was put on hold until these patients completed the study. If ≥25% of the patients did not tolerate Mepitel® Film, the study was to be terminated. In this case, comparisons regarding radiation dermatitis were performed according to the intent-to-treat principle and additionally in the per-protocol-set. Comparisons for grade ≥2 and grade ≥3 radiation dermatitis were performed with the Fisher's exact test on a two-sided significance level of 5%.

Results

At the time of the interim analysis, 57 patients were randomized (28 MEP, 29 STD). Since in the MEP-group, 13 of 28 patients (46.4%) did not tolerate the dressing, the trial was stopped prematurely. At this time, both groups were well balanced for stratification factors and additional characteristics (Table 1). Of the 28 patients of the MEP-group, 3 patients withdrew their consent to participate in the study after 6 Gy, 14 Gy and 36 Gy, respectively, and 2 patients died after 16 Gy and 44 Gy, respectively. Since for these patients, data at 50 Gy were missing, 23 patients remained for intention-to-treat analyses. In the STD-group, one patient died after 36 Gy, and 28 patients could be analyzed.

At 50 Gy, grade 2 radiation dermatitis was observed in 8/23 patients (34.8%) in the MEP-group and 10/28 patients (35.7%) in the STD-group ($p = 1.00$). Grade 3 radiation dermatitis was not observed ≤50 Gy. At 60 Gy, grade ≥2 dermatitis rates were 65.2%

(15/23 patients) in the MEP-group vs. 59.3% (16/27) in the STD-group ($p = 0.77$), and grade $\geq$3 dermatitis rates were 4.3% (1/23) and 11.1% (3/27), respectively ($p = 0.61$).

Thirteen patients did not tolerate the dressing due to discomfort/distress ($n = 8$) or feeling of tightness ($n = 5$). In additional 5 patients (17.9%), MEP did not adhere properly to the skin. One patient died after 16 Gy (acute renal failure). Thus, 9 patients of the MEP-group were eligible for per-protocol-analyses at 50 Gy. Between 50 and 60 Gy, additional 2 patients (1 itching, 1 moist desquamation during change of dressing) refused to wear the dressing any longer; 7 patients remained for analyses at 60 Gy. In the STD-group, one patient died after 36 Gy (gastrointestinal bleeding), one patient received cetuximab instead of planned chemotherapy. Thus, 27 patients remained for per-protocol-analyses. For one patient, grade of radiation dermatitis was not available at 60 Gy. According to recommendations of the ethics committee, analyses regarding radiation dermatitis were performed in the per-protocol-set. At 50 Gy, grade 2 radiation dermatitis was observed in 3/9 patients (33.3%) in the MEP-group and 9/27 patients (33.3%) in the STD-group ($p = 1.00$). At 60 Gy, grade $\geq$2 dermatitis rates were 57.1% (4/7) vs. 57.7% (15/26), respectively ($p = 1.00$), and grade 3 radiation dermatitis rates were 14.3% (1/7) and 11.5% (3/26), respectively ($p = 1.00$).

In the intent-to-treat population, grade 2 dermatitis $\leq$50 Gy occurred after median 23 (19–25) fractions in the MEP-group and 23 (9–25) fractions in the STD-group. Median pain scores at the irradiated skin were 0.0 (0–7) in the MEP-group vs. 0.0 (0–7) in the STD-group at 50 Gy, and 2.0 (0–6) vs. 2.5 (0–8) at 60 Gy. The comparison of the pain scores is descriptive, since many patients received already analgesics due to oral mucositis prior to radiation dermatitis.

Discussion

To improve the results of radio(chemo)therapy for SCCHN, considerable research has been carried out [11–21]. Prognoses of patients can be improved, if interruptions of radiotherapy, mainly caused by adverse events, are avoided [4,5].

Semi-permeable dressings were investigated to prevent and treat radiation dermatitis [8,9,22,23].

In a randomized trial of 74 breast cancer patients receiving mainly 50 Gy in 25 fractions following mastectomy, Mepilex® Lite did not significantly reduce the incidence of moist desquamation (19% vs. 15%, $p = 0.55$) [23]. However, overall severity of radiation dermatitis was reduced by 41%.

Another randomized trial of 88 patients with nasopharynx cancer, who developed moist dermatitis during radiochemotherapy, compared wound care and wound cleansing with ($n = 43$) vs. without ($n = 45$) Mepilex® Lite [8].Addition of Mepilex® Lite was associated with significantly shorter time to wound-healing (median 16 vs. 23 days, $p = 0.009$).

Another randomized intra-patient controlled trial of 80 breast cancer patients compared prophylactic skin care with a Mepitel® Film to aqueous cream [9]. Patients received radiotherapy following breast-conserving surgery ($n = 46$) or mastectomy ($n = 34$), mainly with 50 Gy in 25 fractions ($n = 37$) or 40 Gy in 15 fractions ($n = 36$). A boost was administered in 28 patients. Mepitel® Film reduced the rate of any grade of radiation dermatitis (44% vs. 100%).

Considering these promising results, we assumed that Mepitel® Film would reduce radiation dermatitis in patients with locally advanced SCCHN and initiated the RAREST-01 trial [10]. Since in the interim analysis, 46.4% of patients did not tolerate Mepitel® Film, the trial was terminated. The proportion of patients not tolerating the dressing was unexpectedly high compared to breast cancer trials, where the majority of patients [preferred Mepilex® Lite or Mepitel® Film over cream [9,23]. This difference can be explained by cancer site. Wearing a dressing in the head-and-neck region appears more burdensome, particularly regarding feeling of tightness, than at breast or chest. Distress due to feeling stigmatized is more likely if a dressing is attached to the head-and-neck region and obvious to the public. In our trial the dressing did not adhere properly to the skin in some patients, which may cause distress and is more likely in men with beards.

After completion of the RAREST-01 trial, a feasibility-study comparing Mepitel® Film to a moisturizing cream for dry skin, in patients with head-and-neck cancer was published [24]. Patients in New Zealand received 60–66 Gy in 30 fractions, patients in China 74 Gy in 37 fractions. If radiochemotherapy was indicated, weekly cisplatin (40 mg/m2) was used in New Zealand, weekly nedaplatin (25 mg/m2) in China. Of 11 Chinese patients, almost 50% found the dressing very itchy, 3 (27.3%) rated the dressing as uncomfortable and one patient (9.1%) reported a feeling of tightness. Five of 11 Chinese patients (45.6%) and 6 of 16 patients (37.5%) from New Zealand stated that the dressing did not adhere properly to the skin. No patient from New Zealand complained about itching. The regional differences demonstrate that it is difficult to compare results from different countries.

The RAREST-01 trial did not show superiority of Mepitel® Film over standard care regarding prevention of radiation dermatitis. Comparisons between trials investigating semi-permeable dressings for radiation dermatitis must be made with caution, since they differed with respect to primary tumor type, type of randomization, primary endpoints, and assessment of radiation dermatitis [8,9,22–24].

In the RAREST-01 trial, dermatitis rates between MEP-group and STD-group were not significantly different at 50 Gy and 60 Gy, neither in the intention-to-treat population nor the per-protocol-set. This may be partially explained by the small number of patients remaining after early termination of the trial. Rates of grade $\geq$2 radiation dermatitis were lower than expected in both groups. One reason for the favorable results in the STD-group may the use of a combination of fatty cream plus/minus urea and mometasone furoate cream, which might be more effective than aqueous and moisturizing creams used in previous studies. In contrast to previous trials, where patients were seen three times a week, patients of the RAREST-01 trial were seen at least five times per week. Moreover, standard skin care was performed 4 times per day compared to twice daily. Performing skin care 4 times a day requires a high level of discipline and compliance from the patients. Daily reminders regarding skin care by staff-members may have improved patients' compliance. Proper daily skin care would likely have led to decreased incidence and severity of radiation dermatitis.

In summary, many patients did not tolerate Mepitel® Film, which led to premature termination of this trial. In patients remaining for analyses, MEP appeared not superior to STD in preventing grade $\geq$2 radiation dermatitis. Due to the small number of remaining patients, the validity of this conclusion is limited. The question whether selected patients may benefit from the dressing, must be answered in additional trials.

Role of the funding source

As part of the project InnoCan, the RAREST-01 study was funded by the European Regional Development Fund through the Interreg Deutschland-Danmark program (reference: Innoc 11-1.0-15). The funding body has no role in the design of the study, in collection, analysis and interpretation of the data and in writing of the manuscript.

Declaration of Competing Interest

The authors declare no conflicts of interest related to this study.

References

[1] Rades D, Kronemann S, Meyners T, Bohlen G, Tribius S, Kazic N, et al. Comparison of four cisplatin-based radiochemotherapy regimens for nonmetastatic stage III/IV squamous cell carcinoma of the head and neck. Int J Radiat Oncol Biol Phys 2011;80:1037–44. https://doi.org/10.1016/j.ijrobp.2010.03.033.

[2] Nevens D, Duprez F, Daisne JF, Laenen A, De Neve W, Nuyts S. Radiotherapy induced dermatitis is a strong predictor for late fibrosis in head and neck cancer. The development of a predictive model for late fibrosis. Radiother Oncol 2017;122:212–6. https://doi.org/10.1016/j.radonc.2016.08.013.

[3] National Institutes of Health/National Cancer Institute: Common Terminology Criteria for Adverse Events (CTCAE) version 4.03. National Institutes of Health/National Cancer Institute 2010.

[4] Rades D, Stoehr M, Kazic N, Hakim SG, Walz A, Schild SE, et al. Locally advanced stage IV squamous cell carcinoma of the head and neck: impact of pre-radiotherapy hemoglobin level and interruptions during radiotherapy. Int J Radiat Oncol Biol Phys 2008;70:1108–14. https://doi.org/10.1016/j.ijrobp.2007.07.2380.

[5] Fesinmeyer MD, Mehta V, Blough D, Tock L, Ramsey SD. Effect of radiotherapy interruptions on survival in medicare enrollees with local and regional head-and-neck cancer. Int J Radiat Oncol Biol Phys 2010;78:675–81. https://doi.org/10.1016/j.ijrobp.2009.08.004.

[6] Rades D, Fehlauer F, Wroblesky J, Albers D, Schild SE, Schmidt R. Prognostic factors in head-and-neck cancer patients treated with surgery followed by intensity-modulated radiotherapy (IMRT), 3D-conformal radiotherapy, or conventional radiotherapy. Oral Oncol 2007;43:535–43. https://doi.org/10.1016/j.oraloncology.2006.05.006.

[7] Rades D, Stoehr M, Meyners T, Bohlen G, Nadrowitz R, Dunst J, et al. Evaluation of prognostic factors and two radiation techniques in patients treated with surgery followed by radio(chemo)therapy or definitive radio(chemo)therapy for locally advanced head-and-neck cancer. Strahlenther Onkol 2008;184:198–205. https://doi.org/10.1007/s00066-008-1825-3.

[8] Zhong WH, Tang QF, Hu LY, Feng HX. Mepilex Lite dressings for managing acute radiation dermatitis in nasopharyngeal carcinoma patients: a systematic controlled clinical trial. Med Oncol 2013;30:761. https://doi.org/10.1007/s12032-013-0761-y.

[9] Herst PM, Bennett NC, Sutherland AE, Peszynski RI, Paterson DB, Jasperse ML. Prophylactic use of Mepitel Film prevents radiation-induced moist desquamation in an intra-patient randomised controlled clinical trial of 78 breast cancer patients. Radiother Oncol 2014;110:137–43. https://doi.org/10.1016/j.radonc.2014.01.005.

[10] Narvaez C, Domer C, Idel C, Setter C, Olbrich D, Ujmajuridze Z, et al. Radiotherapy related skin toxicity (RAREST-01): Mepitel® film versus standard care in patients with locally advanced head-and-neck cancer. BMC Cancer 2018;18:197. https://doi.org/10.1186/s12885-018-4119-x.

[11] Denis F, Garaud P, Bardet E, Alfonsi M, Sire C, Germain T, et al. Final results of the 94-01 French Head and Neck Oncology and Radiotherapy Group randomized trial comparing radiotherapy alone with concomitant radiochemotherapy in advanced-stage oropharynx carcinoma. J Clin Oncol 2004;22:69–76. https://doi.org/10.1200/JCO.2004.08.021.

[12] Adelstein DJ, Li Y, Adams GL, Wagner Jr H, Kish JA, Ensley JF, et al. An intergroup phase III comparison of standard radiation therapy and two schedules of concurrent chemoradiotherapy in patients with unresectable squamous cell head and neck cancer. J Clin Oncol 2003;21:92–8. https://doi.org/10.1200/JCO.2003.01.008.

[13] Bernier J, Domenge C, Ozsahin M, Matuszewska K, Lefèbvre JL, Greiner RH, et al. Postoperative irradiation with or without concomitant chemotherapy for locally advanced head and neck cancer. N Engl J Med 2004;350:1945–52. https://doi.org/10.1056/NEJMoa032641.

[14] Cooper JS, Pajak TF, Forastiere AA, Jacobs J, Campbell BH, Saxman SB, et al. Postoperative concurrent radiotherapy and chemotherapy for high-risk squamous-cell carcinoma of the head and neck. N Engl J Med 2004;350:1937–44. https://doi.org/10.1056/NEJMoa032646.

[15] Kanayama N, Kierkels RGJ, van der Schaaf A, Steenbakkers RJHM, Yoshioka Y, Nishiyama K, et al. External validation of a multifactorial normal tissue complication probability model for tube feeding dependence at 6 months after definitive radiotherapy for head and neck cancer. Radiother Oncol 2018;129:403–8. https://doi.org/10.1016/j.radonc.2018.09.013.

[16] Fukushima Y, Someya M, Nakata K, Hori M, Kitagawa M, Hasegawa T, et al. Influence of PD-L1 expression in immune cells on the response to radiation therapy in patients with oropharyngeal squamous cell carcinoma. Radiother Oncol 2018;129:409–14. https://doi.org/10.1016/j.radonc.2018.08.023.

[17] Zwirner K, Hilke FJ, Demidov G, Ossowski S, Gani C, Rieß O, et al. Circulating cell-free DNA: A potential biomarker to differentiate inflammation and infection during radiochemotherapy. Radiother Oncol 2018;129:575–81. https://doi.org/10.1016/j.radonc.2018.07.016.

[18] Murthy V, Lewis S, Kannan S, Khadanga CR, Rangarajan V, Joshi K, et al. Submandibular function recovery after IMRT in head and neck cancer: a prospective dose modelling study. Radiother Oncol 2018;129:38–43. https://doi.org/10.1016/j.radonc.2018.02.021.

[19] Overgaard J, Hoff CM, Hansen HS, Specht L, Overgaard M, Lassen P, et al. DAHANCA 10 - Effect of darbepoetin alfa and radiotherapy in the treatment of squamous cell carcinoma of the head and neck. A multicenter, open-label, randomized, phase 3 trial by the Danish head and neck cancer group. Radiother Oncol 2018;127:12–9. https://doi.org/10.1016/j.radonc.2018.02.018.

[20] Linge A, Schötz U, Löck S, Lohaus F, von Neubeck C, Gudziol V, et al. Comparison of detection methods for HPV status as a prognostic marker for loco-regional control after radiochemotherapy in patients with HNSCC. Radiother Oncol 2018;127:27–35.

[21] Lacas B, Bourhis J, Overgaard J, Zhang Q, Grégoire V, Nankivell M, et al. Role of radiotherapy fractionation in head and neck cancers (MARCH): an updated meta-analysis. Lancet Oncol 2017;18:1221–37. https://doi.org/10.1016/S1470-2045(17)30458-8.

[22] Diggelmann KV, Zytkovicz AE, Tuaine JM, Bennett NC, Kelly LE, Herst PM. Mepilex Lite dressings for the management of radiation-induced erythema: a systematic inpatient controlled clinical trial. Br J Radiol 2010;83:971–8. https://doi.org/10.1259/bjr/62011713.

[23] Paterson DB, Poonam P, Bennett NC, Peszynski RI, Van Beekhuizen MJ, Jasperse ML, et al. Randomized intra-patient controlled trial of Mepilex Lite dressings versus aqueous cream in managing radiation-induced skin reactions post-mastectomy. J Cancer Sci Ther 2012;4:347–56. https://doi.org/10.4172/1948-5956.1000166.

[24] Wooding H, Yan J, Yuan L, Chyou TY, Gao S, Ward I, et al. The effect of Mepitel Film on acute radiation-induced skin reactions in head and neck cancer patients: a feasibility study. Br J Radiol 2018;91:20170298. https://doi.org/10.1259/bjr.20170298.