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Complex Decongestive Therapy and Additional Physiotherapy in Male Breast Cancer: A Case-Report

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Abstract

Introduction: Male Breast Cancer is a very rare disease associated with delayed diagnosis and a more invasive or aggressive tumor therapy, i.e., surgery, radiation, chemotherapy and hormone therapy. Lymphedema, shoulder joint restrictions, posture failures, sensitivity disorders, pain or cancer-related fatigue are common complaints.

Method: The case of a 51-year-old patient with left upper limb lymphedema, shoulder joint restrictions, pain (axilla, phantom), and functional impairments after neoadjuvant chemotherapy, surgery, radiation and ongoing Tamoxifen therapy is described. He accomplished 20 therapy sessions of complex decongestive therapy as well as physiotherapeutic techniques aimed at shoulder joint, scar, muscle strength and balance. He was instructed to self-apply scar therapy and received a customized home exercise program. The parameters measured and applied were arm circumference, shoulder range of motion, the Vancouver Scar Scale, pain (NRS) and the SPADI questionnaire.

Results: The arm volume was reduced by 265ml (T1-T3). Pain was reduced by 4 points (axilla) and 1 point (phantom) NRS, respectively. The Vancouver Scar scale was improved by 3 points. Shoulder ROM improved but did not reach normalcy. The SPADI first deteriorated, followed by a subsequent improvement.

Conclusion: CDT and accompanying physiotherapeutic techniques were able to improve lymphedema and the accompanying morbidities in a case of male breast cancer. Different techniques were selected and combined to meet the individual patient´s needs. Lymphtherapists should reflect on additional measurement methods to display other symptoms but only volume change.

Keywords: Male Breast Cancer; Complex Decongestive Therapy; Shoulder Range of Motion

Abbreviations: ADL: Activities of Daily Life; ALND: Axillary Lymph Node Dissection; BC: Breast Cancer; BMI: Body Mass Index; CDT: Complex Decongestive Therapy; CRF: Cancer-related Fatigue; CT: Chemotherapy; HER: Human Epidermal Receptor Growth Factor; LE: Lymphedema; LN: Lymph Nodes; MBC: Male Breast Cancer; MLD: Manual Lymphatic Drainage; NRS: Numeric Rating Scale; PET: Positron Emission Tomography; PT: Physiotherapy; ROM: Range of Motion; RT: Radiotherapy; SLND: Sentinel Lymph Node Dissection; SPADI : Shoulder Pain and Disability Index

Introduction

Male breast cancer (MBC) is a rare disease. In 2017 in Austria 62 cases (1,1%) [1], in Germany 720 cases (1,01%) were diagnosed [2], similar to international counts [3]. The diagnosis is often delayed. Evident lumps, mamilla retraction and enlargement of axillary lymph nodes (LN) [4] lead to diagnosis. There is a time gap of 6 months from detecting the first symptoms to the final diagnosis [5], leading to advanced tumor stages [6]. MBC is significant because almost the whole attention is focused on female breast cancer. Neither patients nor medical staff will suspect this diagnosis in the first place.

Therapy is extrapolated from female patients [7], although we should not underestimate gender-driven differences in therapy response (e. g. hormonal regulation) [6]. Because of these differences, therapist and patient must face the possibility of a non-curable disease, reaching palliative phase with higher probability.

The choice of treatment is modified radical mastectomy [7] and axillary LN dissection (ALND) [6]. Breast-conserving surgery is limited to T1N0-stages [8], although disease-free survival-rates would advocate it [9]. Sentinel node dissection (SLND) is performed in 18-25% [10] and reduces edema risk to 5% [11]. Breast and LN radiotherapy (RT) serves against local recurrences [5, 12]. This is followed by therapy with Tamoxifen/Aromatase Inhibitors [6, 13], because 90% are hormone receptor positive [14]. Chemotherapy (CT) is indicated for advanced disease [8].

23% developed lymphedema (LE) [15], like female patients [16], a protein-rich edema with a loss of lymphatic function (17). Additional morbidities are restrictions in shoulder joint (ROM) [15, 18], postural weakness [19], sensibility disorders, pain [3, 20] or osteoporosis [21].

A post-surgery physiotherapy (PT) for disease-related morbidities was suggested [22-23]. Possible aims are LE, shoulder ROM and the scar [24]. RT-induced fibrosis also compromises lymphatic flow [24]. Standard treatment of LE is complex decongestive therapy (CDT) [25] with manual lymphatic drainage (MLD), compression therapy, skin care and sports therapy [26]. Special MLD grips aim at shoulder ROM, combined with breathing exercises and patient instruction [27]. Further focus is laid on RT-compromised trunk mobility and lung function [28]. Weak muscles (CT, inactivity) should be strengthened [29]. Cancer-related fatigue (CRF) [30, 31] and side effects from hormone therapy [32] and CT [33] need intervention [34-35].

The objective of this case-report was to assess, if CDT and PT could influence edema, shoulder ROM, function and the scar in advanced MBC.

Methods

The case of a 51-year-old MBC patient is reported by using the CARE Guidelines format [36]. The patient gave his informed consent to use all the medical and PT data gathered. Ethical approval was applied for but was unnecessary within this design. All the data is presented by descriptive statistics.

Outcomes

Outcome variables at 3 time points (T1 = beginning, T2 = after 10 treatments; T3 = after 20 treatments) were: arm circumference,

arm volume (calculated using Kuhnke's method) [37], shoulder ROM (flexion, abduction), the SPADI questionnaire for pain and daily impediments, the Vancouver Scar Scale [38] as well as pain (axilla and phantom pain) (numeric rating scale, NRS) [39]. SPADI consists of 2 subscales (5 questions on pain, 8 on function, 130 points max). Questions are answered with a 10-point scale (0-10; 0 = no pain, function not difficult; 10 = worst imaginable pain, function not performable). It was already used within BC-associated problems [40-41] and allows an account of the functional status and activity-limitations [42] with approved validity in German [43]. The Vancouver Scar Scale combines the items vascularity, pigmentation, pliability, and height (13 points max). In both scales fewer points indicate an improvement. The Vancouver Scar Scale was recommended as a valid assessment for scars after BC [38].

Anamnesis: MBC was confirmed by biopsy within this patient (191 cm, 91 kg) after a pre-existing left gynecomastia and an areola located swelling in December 2019 (G3, invasive-ductal, T2N1Mx). Estrogen receptors were 100%, progesterone receptor 10% positive, HER2-new 2+. A PET revealed additional neoplasms (pre-pectoral subcutaneous, sternal, scapular, axilla). The patient started with neoadjuvant weekly CT the same month (Paclitaxel plus antiemetic Paspertin). After the 2nd cycle he developed a temporary CRF and after the 3rd cycle neutropenia, which was treated with Accofil and Glandomed. In the 5th cycle Paclitaxel was reduced to 200mg. Before the 6th cycle, he showed 3rd degree neutropenia, this led to the prescription of G-CSF. After 8 cycles his general condition was satisfactory therefore the dose was raised to 250mg. After the 11th cycle he developed temporary 1st degree polyneuropathy. After 12 cycles the various tumors were declining, followed by a new prescription of Epirubicin, Cyclophosphamid and G-CSF (4 cycles), which led to a new development of CRF, 1st degree dysgeusia and 6 kg weight gain.

In June 2020 a modified radical mastectomy and ALND (levels I/II) was performed. 34 lymph nodes (5 positive) were resected. Postoperative healing was without complication. Ward PT instructed him on shoulder ROM. 3 weeks after surgery RT was started and targeted at the thoracic wall and supraclavicular region (50 Gy, 25 fractions), and additional 60 Gy at the scar region (5 fractions) accompanied by moisturizing skin maintenance. At the same time the patient started taking Tamoxifen. At the end of the RT the patient complained of pronounced CRF, pain and shoulder ROM restrictions. The thoracic skin had developed erythema, a LE was suspected. In February 2021 the skin was greatly improved, but ROM was even worse. The patient went to stationary rehabilitation in February/March 2021. A whole-body PET, scull computer tomography and breast duplex were inconspicuous, Tamoxifen tolerance was moderate (menopause complaints I-II). In June 2021, the patient suffered an ankle fracture. Densitometry showed significant osteoporotic changes followed by Calciduran and Oleovit prescriptions.

PT anamnesis September 2021: LE stage I left arm (non-dominant hand) [44] according to the International Society of Lymphology´s staging [45]. Positive Stemmer´s sign [46] at meta-carpal I/II, lower arm, and dorsal axilla (cp. Figure 1, Upper Body). Medial to lateral directed scar (cp. Figure 2). Shoulder ROM (flexion, abduction) was limited (cp. Table 1) due to a shortening of the Pectoralis and Latissimus dorsi muscle. Reduced muscle strength (Triceps, Lat. dorsi, Deltoid muscle 5/6) [47]. He was able to perform normal activities of daily life (ADLs) but was handicapped because of a lack of ROM and strength. He had axillary pain and intermittent phantom pain (cp. Table 1). The last tumor assessments (March 2022) were inconspicuous with ongoing complaints of Tamoxifen side effects.

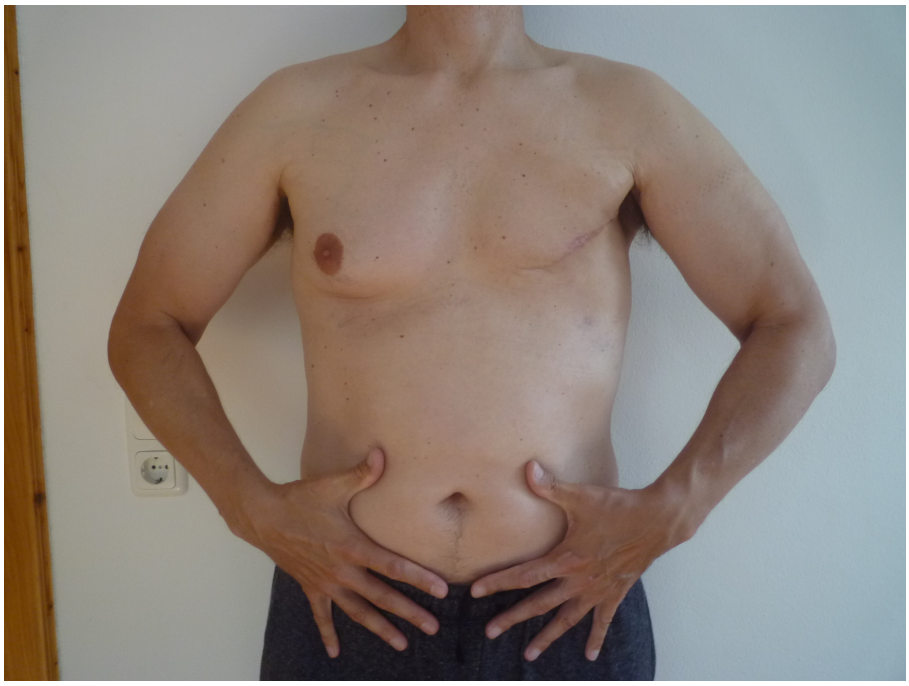

Figure 1: Upper body

Interventions

Weekly CDT started in September 2021 until December and was continued in February 2022 until July. Treatment was interrupted because of a therapist´s COVlD-19 infection in April. CDT consisted of MLD [45, 48, 50] MLD scar treatment and compression sleeve and glove without fingertips CCL II 23-32 mmHg (49), daily application. Patient instruction included written instructions for edema prophylaxis and rules of conduct for everyday life. Additional techniques were: a) manual shoulder joint techniques to improve ROM; b) instruction of "Makarasana" supine yoga exercise and "Parshva Trikona" while standing with left arm resting on a wall for thorax stretching; c) bilateral active flexion/abduction/external rotation and bilateral abduction in double-stance with rubber band to improve ROM and muscle strength. Left arm adduction with rubber band while standing to harmonize scapula-shoulder ROM; d) active hand muscle pump (Hand master plus Hand- und Finger trainer). Stretching and pump exercises were to be applied daily, strength training 2-3 times a week, furthermore instructions for self-applied scar therapy (5 mins daily). The 2nd series was amended adding general strengthening because of his osteoporosis (lunges combined with butterflies, "good mornings" combined with one arm flexion with 1.5kg dumbbells) and balance training because of polyneuropathy-associated balance problems.

Results

Table 1: Variables measured

Parameter	Date			
	T1 09/2021	T2 12/2021	T3 07/2022	Right arm
Volume left upper limb	4004,96ml	3900,97ml	3739,8ml	3700,8ml
Vancouver Scar Scale	7	5	4	n.a.
SPADI	22,3	32,3	25,4	n.a.
ROM Flex	120°	128°	145°	n.a.
ROM Abd	108°	116°	128°	n.a.

Pain Axilla NRS	8	5,5	4	n.a.
Phantom Pain NRS	6	4,5	5	n.a.

Legend: SPADI: Shoulder Pain and Disability Index; ROM: Range of Motion; NRS: Numeric Rating Scale

Discussion

Different factors are discussed with a LE development: BMI ≥25, advanced tumor stage, mastectomy, ALND, neoadjuvant CT and RT. The excision of >30 lymph nodes led to 3-fold odds in comparison to a dissection of <30 nodes (50). Many predisposing factors applied to this patient. Visible LE is only detectable if the lymph capacity falls short of 20% [51]. Taking a cut-off value of a 10% volume increase as the definition for LE, the patient cohort of McDuff et al. (2019) showed the greatest risk at 12-30 months post-surgery [52]. In contrast to the beforementioned study, no pre-surgery arm volume was taken which could have been used as comparison [53]. Only this could have stated a LE with certainty. Because of hand dominance side differences of >5% have been described [54]. ADL insufficiencies and healthy arm compensatory mechanisms can possibly lead to hypertrophy at the contralateral side and therefore conceal a mild edema, if only comparing volumes.

The primary goal of CDT is to achieve a volume reduction. This patient lost 104 ml (T1-T2; 2,6%) and 265 ml (6,6%, T1-T3), respectively. 45´ are a standardized timeframe for an arm CDT [40]. He was classified with LE stage I, (cp. Figure 1), so mobilizing great fluid quantities could not have been anticipated. Ozcan et al. (2018) documented a mean loss of 249ml in their cohort (n=37), Borman et al. (2021) 319ml after 15 therapies in 3 weeks, 96 % of these with a mild/moderate LE. The "minimal detectable change" to show an actual change of volume was defined as 150ml [55], this was reached at T3. After LE detection, patients should start CDT early, this enhances the chances of therapeutic success [40]. Starting later could result in ongoing non-reversible morbid lymphatic changes [48]. The patient's good adherence to compression and exercises surely played a part in the volume reduction [40] because dynamic exercises enhance lymphatic flow [56]. This was achieved by employing the "Hand trainer", which works in finger flexion and extension. Smoot et al. described that women with LE showed worse ratings in functional assessments [57], indicating a connection of these variables. CDT also aims at pain and shoulder ROM [58]. This is achieved by special MLD grips combining lymph flow enhancement and shoulder ROM. The pain-reducing effect of MLD has already been described (58-60). In this patient, a reduction of axillary pain (4 points NRS T1-T3; 36 %) and phantom pain (1-point T1-T3; 9 %) was detectable. A possible explanation is the nociceptive inhibition of spinal neurons via a vagal stimulation [61]. Phantom pain after mastectomy was depicted by Ahmed (2014) [62]. It is explainable by a lack of sensory input [63]. Thoracic MLD could have increased this input. The axillary pain reduction therefore exceeded the described MCID of 30% [64].

Scar tissue impairs the scar pliability as well as that of adjacent tissue. Scar length and tissue (cp. Figure 2) also have an impact on arm/thorax mobility. Home-exercises improved this pliability. MLD enhances the disabled scar-associated local lymphatic drainage [65] by mobilizing the skin and collagen tissue adhesions [66]. The scar improved by 3 points (T1-T3), attributed mainly to a pliability improvement. This is supported by a meta-analysis by Deflorin et al. [67].

Figure 2: Scar

A shoulder ROM restriction in flexion/abduction is common after BC [53]. It relates to scar healing and RT-induced skin fibrosis with deleterious effects on the shoulder biomechanics [68-69]. Thorax MLD stretches the skin, additional grips in intercostal spaces could have enhanced firstly thoracic- and subsequently arm ROM, which was confirmed by other authors [70]. RT can induce muscular trigger points [71], leading to pain. The implementation of extended PT concepts showed a 2.4-fold reduction of LE [17], justifying the application of additional exercises and techniques. Shoulder flexion and abduction improved by 25°/20° after 20 therapies, respectively. The standard measurement error of goniometry lies at 7.7° (flexion) and 8.3 (abduction), respectively [72]. Normal ROM lies at 150°-180° (flexion) and 180-184° abduction [73]. An explanation of continuing ROM restrictions is the ongoing RT-induced tissue damage [74] and pain-related avoidance behavior [75]. ROM improvement should have correlated with ADL and SPADI measurement enhancement. A noticeable primary SPADI deterioration (T1-T2 10 points) with secondary improvement (T2-T3 7 points) was measured without reaching baselines. The SPADI MCID decrease from baseline has been determined at 10 to 15 points (rotator cuff tear) [76-77]. This leaves various explanations: the patient claimed at T2 that he had overexerted himself in close timely connection to T2 measurement by helping neighbors. Secondly, a recall bias can lead to a negative assessment of patient-reported outcomes in comparison to baseline values, even reaching a MCID [78]. An "over-reporting of symptoms" is further related to the patient's age (younger), the variability and severity of symptoms (higher) and male gender as well as a longer timespan between measurements [79].

Disease-related inactivity, CRF and a change in protein synthesis by CT can lead to a loss of muscle strength. Reduced strength is correlated to deteriorated ADLs [80]. Strength training was furthermore indicated because of the Tamoxifen therapy and osteoporotic changes (81). Adapted strength training is safe after mastectomy [69] if accompanied by compression [82] with significant improvements [83]. Strength deficits hinder the muscular endurance in daily practice. The intensity was gradually increased to adapt training to muscle status [84].

Findings from this case- report can be of interest to other male breast cancer patients. Firstly, because of delayed diagnosis, male patients must face multiple treatments including treatment-dependent side effects. Although edema prevalence has declined in recent years, approximately every fifth patient will develop one and need decongestive therapy. Secondly, the ROM restriction in flexion and abduction is very common. So, therapies suggested in this case can find application in other patients too.

Conclusion

This case-report shows the multi-layered dimensions in every-day PT practice. CDT and PT techniques were able to improve LE and accompanying morbidities in a case of MBC. Different techniques must be selected and combined to meet the individual patient´s needs. Lymph therapists should reflect on additional measurements to display other symptoms and not only volume change.

Limitation

One limitation is the arm circumference measurement. The setting did not provide an opportunity to employ the gold standard (water displacement). Goniometry has certain tool-derived inaccuracies and reduced test-retest-reliability but is the standard in every-day PT practice.

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Competing Interests

The author declares to not have competing interests.

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