Case Report

Myopia Induced after Systemic Chemotherapy with Docetaxel

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Abstract

Transient myopia is an unreported toxicity of docetaxel. We report an unexpected development of myopia following systemic chemotherapy with docetaxel. A 38-year-old woman undergoing chemotherapy for breast cancer received docetaxel every two weeks. Prior to chemotherapy, she had no visual impairments, ocular disorders, or other comorbidities. After seven cycles of systemic chemotherapy, she began experiencing visual impairment. Her spherical equivalent refractive errors were -2.00 D in the right eye and -1.63 D in the left eye. Uncorrected visual acuity was 0.42 logMAR in the right eye and 0.3 logMAR in the left eye, both correctable to 0 logMAR. At a 4-week follow-up after cessation of chemotherapy, her vision gradually recovered. To our knowledge this is the first reported case of docetaxel induced myopia in a patient undergoing cancer treatment in the English literature, underscoring the need for clinicians to be aware of this potential ocular toxicity.

Keywords: Breast Cancer; Chemotherapy; Myopia; Docetaxel; Visual Acuity.

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Introduction

Myopia is a significant public health problem [1]. Breast cancer is the most frequently diagnosed cancer among women worldwide [2]. With the development of new chemotherapy treatment options drug toxicities have become an important complication [3].

Docetaxel (Taxotere) is one of the most effective chemotherapeutic agents for advanced breast cancer and other common malignancies [4]. It belongs to the taxane group, an antimitotic (anti-microtubule) agent [4]. Docetaxel disrupts the normal dynamic process of the microtubule network, leading to inhibition of mitosis and cell division, and it distributes widely throughout all body tissues [4]. Refractive error changes may represent as a side effect of chemotherapy with docetaxel [3, 4]. Here we present a 38-year-old woman undergoing chemotherapy for breast cancer with docetaxel developing myopia. To our knowledge this is the first reported case of docetaxel-induced myopia in a patient undergoing breast cancer treatment in the English literature, underscoring the need for clinicians to be aware of this potential ocular toxicity.

Case Report

We report a case of an unexpected refractive error shift (myopia) following chemotherapy treatment with docetaxel. This case report adheres to the principles of the Declaration of Helsinki and was approved by the institutional ethics committee. The patient gave written consent before the case being reported.

A 38-year-old Iranian woman with grade 3 invasive ductal carcinoma of the breast was undergoing chemotherapy with docetaxel administered every two weeks at a dosage of 120 mg/m. She had previously undergone laser subepithelial keratomileusis (LASEK) many years ago. Refractive errors, uncorrected and corrected distance visual acuity, Schirmer test (under non-anesthetized conditions), non-invasive breakup time (NIBUT), eye movement accuracy, color vision (assessed using the Farnsworth D-15 hue discrimination test and Ishihara pseudoisochromatic plates), and near vision were examined before chemotherapy. She had no visual impairments, ocular disorders, or systemic/chronic diseases apart from breast cancer.

After three cycles of chemotherapy, the eye examination was repeated (Table 1).

After seven cycles of chemotherapy, she presented with complaints of blurred vision in both eyes. An ocular examination was repeated (Table 1). Hematological and biochemical parameters were analyzed and found to be within normal limits, with blood glucose levels below 100 mg/dL. Intraocular pressures were 16 mmHg in the right eye (OD) and 14 mmHg in the left eye (OS). Fundus examination did not reveal any abnormalities in the retina or optic nerve head, and posterior segment optical coherence tomography also showed no abnormalities (Figure 1).

At a four-week follow-up after discontinuation of the drug, her vision began to improve spontaneously, with results approaching those recorded before chemotherapy. Corneal central and peripheral curvature in separate meridians is presented in table 2.

Discussion

The main ocular side effects associated with docetaxel include epiphora, cystoid macular edema, maculopathy, erosive conjunctivitis, punctal stenosis, canalicular narrowing and nasolacrimal duct obstruction, conjunctivitis,

Table 1: Eye examination results of the presented case

Variables	Before chemotherapy		After 3 times		After 7 times		After 4 weeks discontinued	
	RE	LE	RE	LE	RE	LE	RE	LE
UDVA (logMAR)	0.10	0.00	0.00	0.00	0.42	0.3	0.19	.07
BCDVA (logMAR)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SE (D)	- 0.50	- 0.375	- 0.375	- 0.25	- 2.00	- 1.625	- 0.50	- 0.375
SPH (D)	0.00	0.00	0.00	0.00	- 1.50	- 1.25	0.00	0.00
CYL (D)	- 1.00	- 0.75	- 0.75	- 0.50	- 1.00	- 0.75	- 1.00	- 0.75
Axis (degree)	149	31	148	18	153	16	144	16
Near ADD (D)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NVA.sc (logMAR)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean KR (D)	44.00	44.00	43.75	43.75	44.25	43.75	44.25	43.75
MEAN PKR (D)	43.75	43.75	44.37	43.75	43.87	43.87	36.00	43.75
Color vision	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
EOM	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
SIT score (mm)	3.00	2.00	2.00	2.00	0.00	1.00	1.00	0.00
NIBUT(sec)	5.00	5.00	5.00	5.00	2.00	2.00	2.00	2.00
Phoria	Eso	Eso	Eso	Eso	Eso	Eso	Eso	Eso

UDVA: uncorrected distance visual acuity; BCDVA: best-corrected distance visual acuity; SE: spherical equivalent (D); N.VA.sc: near unaided visual acuity; SPH: sphere (D); CYL: cylinder (D); Near ADD: Near addition (D); D = diopter; KR: K-reading: Mean keratometry; PKR: peripheral K-reading: mean peripheral keratometry; NIBUT: non-invasive breakup time; SIT: Schirmer test; EOM: eye movement's accuracy; Axis: astigmatism axis.

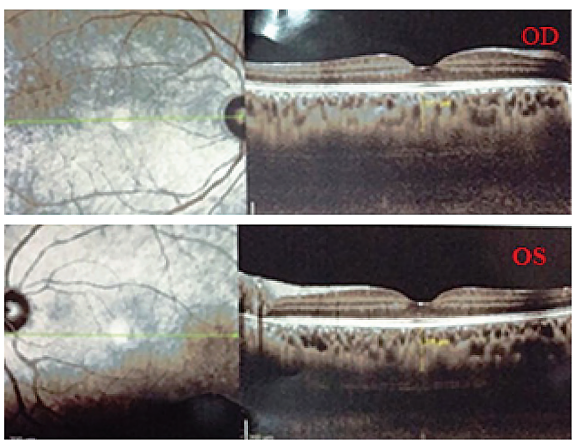
progressive vision loss, and abnormal lacrimation [4, 5-9]. To our knowledge this is the first reported case of docetaxel-induced myopia in a patient undergoing breast cancer treatment in the English literature.

Various mechanisms have been proposed to explain the development of transient myopia following systemic medication use, including accommodative spasm, ciliochoroidal effusion causing forward displacement of the lens–iris diaphragm, or retinal folds [10-12]. Another mechanism is that the drug's entry into the crystalline lens may alter its osmotic status, causing the lens to swell, which can result in

Table 2: The report of corneal central and peripheral curvature in separate meridians

	Variables	Before chemotherapy		After 3 times chemotherapy		After 7 times chemotherapy		4 weeks After discontinuation of chemotherapy	
		RE	LE	RE	LE	R.E	LE	RE	LE
	KR1 (D)	43.25	46.50	43.25	43.25	43.75	43.25	43.5	43.25
	KR2 (D)	44.50	48.00	44.25	44.25	44.75	44.25	44.75	44.25
	PKR1(D)	43.25	43.25	43.25	43.25	43.25	43.25	35.5	43.25
	PKR2(D)	44.25	44.25	45.50	44.25	44.50	44.50	36.5	44.25
PKR in details	Central (D)	43.77	43.66	44.29	43.66	43.95	43.89	35.98	43.72
	Nasal (D)	44.18	44.18	43.49	43.66	44.53	43.27	44.58	43.49
	Temporal (D)	43.55	43.89	44.23	44.12	43.95	44.06	43.49	43.21
	Superior (D)	44.35	43.27	44.23	43.77	43.55	44.23	44.12	43.6
	Inferior (D)	43.27	43.49	43.16	44.35	44.06	43.38	43.55	44.23

KR1: K-reading, flat meridian (D); KR2: K-reading, steep meridian (D); PKR1: peripheral K-reading, flat meridian (D); PKR2:peripheral K-reading, steep meridian (D).



OD: Right eye; OS: Left eye

Figure 1: No abnormalities were detected in the optical coherence tomography exam of our case

myopia and angle closure [13].

Conclusion

Myopia development has not been previously reported in patients undergoing chemotherapy with docetaxel. Although the myopia in our case was transient, it may become permanent if docetaxel is used for a prolonged period. To prevent further complications, ophthalmologists and optometrists should be aware of potential refractive error shifts associated with docetaxel and advise patients to report any signs or symptoms of ocular or visual changes.

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Footnotes and Financial Disclosures

Conflict of interest:

The authors have no conflict of interest with the subject matter of the present manuscript.