Purpose:
To propose a new technique, noncoplanar intensity-modulated radiation therapy (Nonco_IMRT), for young female patients with mediastinal lymphoma, and to evaluate its dosimetric features.

Methods:
We used to adopt a coplanar IMRT technique (Co_IMRT) to treat patients with mediastinal lymphoma. Typically it has 7 equal-spaced beams starting from gantry angle of 206°. Large volume of lungs were irradiated, and also bilateral breasts if the patient were female. Recently, we switched to apply Nonco_IMRT technique which use 2 noncoplanar beams in sagittal plane (couch angle 90°, collimator angle 90°, gantry angle 330° and 30°) replace the 2 beams of Co_IMRT that irradiate breasts and lungs directly. Nonco_IMRT was compared against Co_IMRT through a planning comparison study of 15 young female patients. PTV coverage and OAR dose parameters were analyzed.

Results:
For all patients, the PTV coverage, heart V30 and spinal cord dose were approximately equal between two techniques (P>0.05). But the mean dose and low dose region of bilateral breasts and lungs significantly decreased in noncoplanar IMRT (P<0.05). The reduction of the breast V2.5 and lung V5 was 33.1% and 9.28%, respectively.

Conclusions:
Compared to conventional Co_IMRT, Nonco_IMRT significantly reduces dose to breasts and lungs, and consequently reduces the possibility of breast second cancer and pulmonary toxicity. Besides young female patients, Nonco_IMRT can benefit other mediastinal lymphoma patients as well.