MULTIPHASE ENHANCEMENT PATTERNS OF METASTATIC CERVICAL NODES ON MULTIDETECTOR COMPUTED TOMOGRAPHY (4D-MDCT)

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Purpose: To characterize enhancement patterns of metastatic cervical lymph nodes using multiphase multidectector computed tomography (4D-MDCT).

Materials & Methods: 4D-MDCT images of 15 pathologically proven, metastatic papillary thyroid cancer cervical lymph nodes were retrospectively analyzed, pre- and post- intravenous contrast. As controls, 15 cervical lymph nodes in patients without known cancer, imaged for parathyroid adenomas on 4D-CT were evaluated. Regions of interest were outlined and Hounsfield units (HU) obtained at multiple time points. Baseline HU values were acquired on pre-contrast images. Post-contrast HU values were obtained at three time points including arterial phase at 25 seconds after injection (phase I) and, at two additional delayed time points viz. 55 and 85 seconds (phase II and III) respectively. These values were normalized to the ipsilateral common carotid artery enhancement during phase I and relative HU (rHU) values obtained. Additionally, contrast wash-in and wash-out was calculated using formulas previously published[1].

Results: Metastatic nodes demonstrated the following mean rHU values at the 4 phases: baseline (0 s) =0.12, phase I (25 s) = 0.50, phase II (55 s) = 0.31, phase III = 0.29 (85 s). There was significant increase in the enhancement between the baseline and phase I in the metastatic nodes as opposed to that for normal lymph nodes (Fig1). Further, enhancement was significantly greater at phase I than at phase II or III when compared to the baseline ($p < 0.001$). Concordantly they demonstrated maximum contrast wash-in at phase I (25 s) than at later phases ($p < 0.001$) (Fig 2). There was a steep decline in the enhancement at phase II and even more at phase III for the metastatic nodes.

Conclusion: Metastatic thyroid cervical lymph nodes demonstrate a greater wash-in of contrast on the arterial phase than on delayed phases typically acquired for evaluation of head and neck cancers.

Figure 1

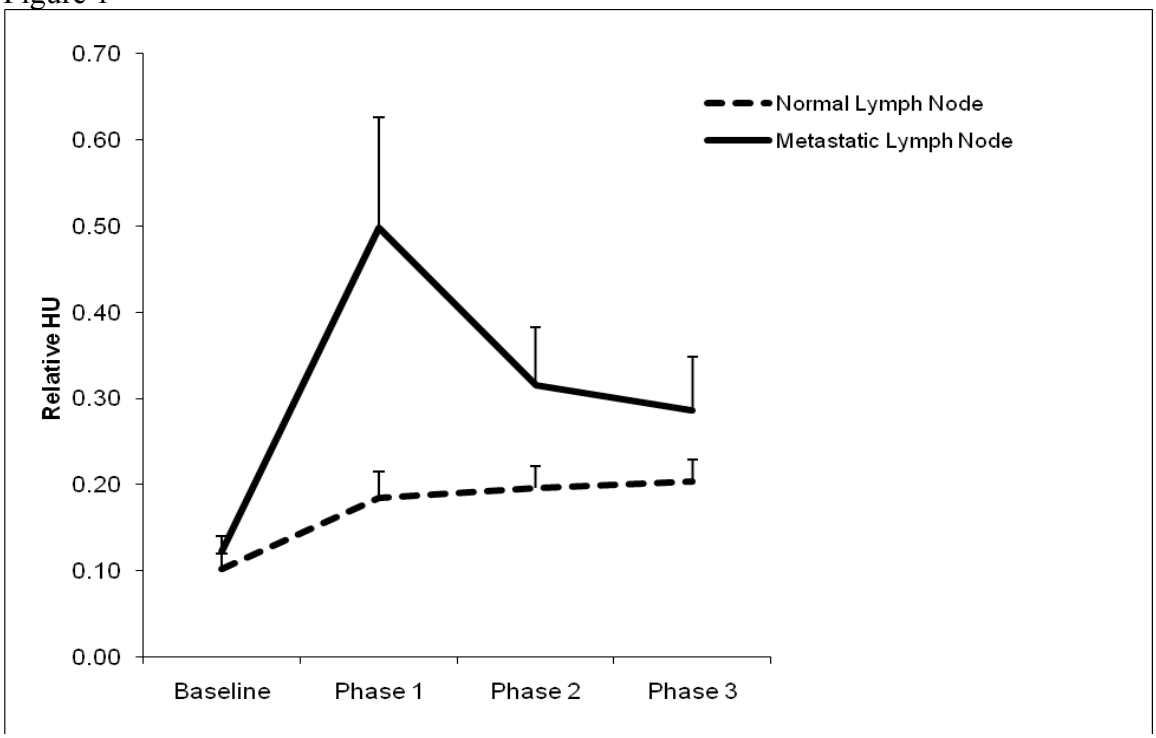
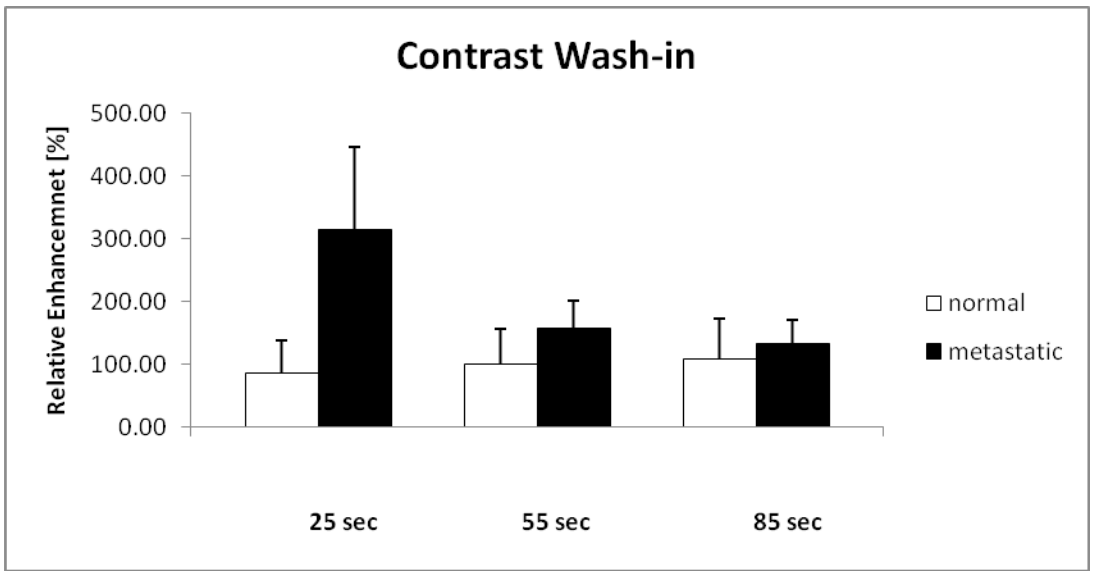

0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Relative HU
Normal Lymph Node
Metastatic Lymph Node
Baseline
Phase 1
Phase 2
Phase 3

Figure 2


Contrast Wash-in
Relative Enhancemnet [%]
500.00
400.00
300.00
200.00
100.00
0.00
25 sec
55 sec
85 sec
normal
metastatic