# THE ROLE OF PERFUSION WEIGHTED IMAGING ON EVALUATION OF SINO-NASAL NEOPLASMS

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## INTRODUCTION

Malignant tumors of the sinonasal cavity represent less than 1% of all cancers, and about 3% of cancers of the upper aerodigestive tract. Majority of malignant tumors of the sinonasal cavity come from the maxillary sinus (50%–70%), followed by nasal cavity (15–30%), ethmoid cavity (10–20%), and rarely the frontal and sphenoid sinuses. Most sinonasal masses present with similar symptoms of nasal obstruction, epistaxis, nasal discharge, and/or facial pain. Additionally, due to limited anatomic real estate, both benign and malignant lesions can cause compressive effects leading to orbital and intracranial complications as well as possible regional cervical metastases.

The majority of malignant tumors exhibit rapid and high contrast enhancement because they are highly vascular and have narrow interstitial space, whereas benign tumors almost always show late contrast enhancement. Simple assessments of enhancement patterns on static enhanced MRIs may be limited in terms of differentiating benign and malignant tumors.

## AIM OF THE WORK

The aim of this study was to assess the possible additive value of perfusion weighted imaging in evaluation of sinonsasal neoplasms.

## PATIENTS AND METHODS

**Patients**: This study will include 30 patients with different Sinonasal lesions presented to the radiodiagnosis department of Alexandria University Hospital for medical imaging..

**Methods:** Thirty patients were examined using Magnetic resonance imaging (MRI) which was performed at 1.5 Tesla MR System using a standard head coil: (Ingenia-CX, Philips, Healthcare, Best, Netherlands).

The contrast material used in the study was Gadolinium diethylene triamine pent acetic acid (Gad-DTPA) (Magnevist).

**Patients were subjected to the following MRI protocols:**

**Conventional MRI Sequences** for anatomical assessment of sinonasal lesions.

**Functional MRI Sequences** including Diffusion weighted imaging (DWI) and Dynamic contrast enhanced MRI (DCE-MRI) for assessment of tumor cellularity and perfusionMRI examinations were performed on 1.5T MR system (Ingenia-CX, Philips, Healthcare, Best, theNetherlands) using 16-channel head-neck surface coil.

Third step was generation of parametric maps of different **Quantitative DCE-MRI parameters** based on the **Extended tofts model** including (Ktrans, VeKep, VP, AUC ).

## RESULTS

a statistically significant difference in ADC values in relation to the benign and malignant groups ($p < 0.001$). In addition, it was found that the ADC value in malignant lesions was lower than the benign group. Table1.

**Table 1:** Comparison between the studied lesions according to diffusion restriction and ADC values.

| | Total sample (n=30) | | Diagnosis | | | | Test of sig. | p |
|---|---|---|---|---|---|---|---|---|
| | | | Benign (n=19) | | Malignant (n=11) | | | |
| | No. | % | No. | % | No. | % | | |
| **Diffusion restriction** | | | | | | | | |
| **Absent** | 16 | 53.3% | 15 | 78.9% | 1 | 9.1% | $\chi^2$= 13.659* | <0.001* |
| **Present** | 14 | 46.7% | 4 | 21.1% | 10 | 90.9% | | |
| **ADC** | | | | | | | | |
| **Min. – Max.** | 0.60-1.80 | | 0.60-1.80 | | 0.60-1.50 | | U = 28.0* | 0.001* |
| **Mean ± SD.** | 1.11±0.41 | | 1.31±0.34 | | 0.77±0.27 | | | |
| **Median** | 1.20 | | 1.30 | | 0.70 | | | |

U: Mann Whitney test

*: Statistically significant at $p \leq 0.05$

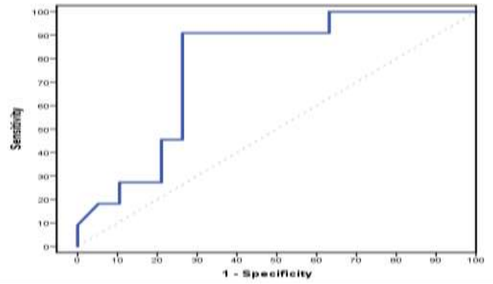


**Figure 1:** ROC For Ktrans

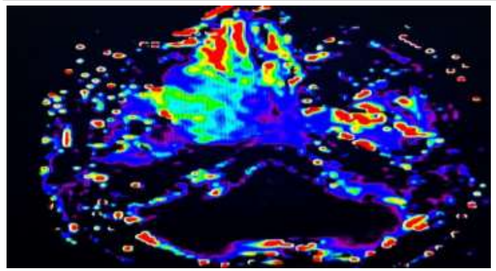

**Figure 2:** Color-coded maps of Ktrans, AUGC and Vp of the tumor underlaid with the dynamic images

## CONCLUSION

- DCE-MRI-related quantitative parameters provide more data for the identification of the nature of the tumor and differentiating between benign and malignant nasal sinus tumors.
- DWI has higher accuracy than DCE-MRI.
- DWI and DCE-MRI have the highest accuracy when used in combination than either of them alone in differentiating benign from malignant sinonasal masses.