

Guidelines for the management of Bosniak 2F Renal Cysts

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Summary and Recommendations

- The Bosniak system is used to classify cystic renal masses seen on imaging
- Only a few studies have correlated cyst classification using the Bosniak system with histological findings after removal of kidneys at surgery. Thus there is a lack of evidence to support the classification's ability to distinguish between benign and malignant masses. Furthermore the system can also suffer from inter-observer variability between what one Radiologist and another will call a Bosniak II or III lesion
- However, the Bosniak classification has been widely adopted and accepted because it addresses a difficult clinical problem and is easy to apply by both radiologists and Urologists
- The risk of malignancy in Bosniak IIF lesions has been variously stated – literature has been quoted to support a risk of at least between 12-20%
- Most authors agree (and literature has been quoted) to suggest that Bosniak IIF lesions should be followed by serial CT scanning, although Graumann et al proposed surveillance by Ultrasound and MRI after initial characterisation of the lesion by CT
- There are no national or international guidelines which stipulate for how long a patient with a Bosniak IIF lesion should undergo radiological surveillance – as such any recommendations that can be made are based on expert opinion from the published literature
- Literature has been provided to support the view that these patients should undergo surveillance for 5 years although in 2009 O'Malley et al suggested that "the minimum follow up remains to be defined"
- **It is the policy of this department to follow Bosniak 2F Renal cysts by CT scans at 6 months, and 1 year, and then annually until 5 years**
- **This policy may be varied to take into account the age and comorbidity of the patient**

Bosniak 2F Renal Cysts

The Bosniak system is used to classify cystic renal masses seen on imaging, and the classification is shown in the table below.

The Bosniak Classification (Warren, & McFarlane 2005)

TABLE 1 The Bosniak classification of renal cysts

Bosniak category	Features
I	A simple benign cyst with a hairline thin wall that does not contain septa, calcification or solid components. It measures as water density and does not enhance with contrast material.
II	A benign cyst that might contain a few hairline thin septa. Fine calcification might be present in the wall or septa. Uniformly high-attenuation lesions of <3 cm that are sharply marginated and do not enhance.
IIF	These cysts might contain more hairline thin septa. Minimal enhancement of a hairline thin septum or wall can be seen and there might be minimal thickening of the septa or wall. The cyst might contain calcification that might be nodular and thick but there is no contrast enhancement. There are no enhancing soft-tissue elements. Totally intrarenal non-enhancing high-attenuation renal lesions of ≥ 3 cm are also included in this category. These lesions are generally well marginated.
III	These lesions are indeterminate cystic masses that have thickened irregular walls or septa in which enhancement can be seen.
IV	These lesions are clearly malignant cystic lesions that contain enhancing soft-tissue components.

It is usually easy to differentiate between lesions at the ends of the spectrum, i.e. the benign simple cysts (Bosniak I) and the clearly malignant Bosniak IV lesions. Bosniak himself recognised that the difficulty lay with distinguishing Bosniak II and III lesions, and this led to the new category of Bosniak IIF which was not contained in the original Bosniak classification (Warren, & McFarlane 2005).

As Warren et al state;

“Simple cysts and solid tumours are usually straightforward to diagnose, but differentiating between complex renal cysts and cystic renal tumours can be difficult. There is a narrow margin between performing unnecessary surgery and missing a cancer” (Warren, & McFarlane 2005)

The Bosniak classification has been widely adopted and accepted because it addresses a difficult clinical problem and is easy to apply by both radiologists and Urologists.

However many of the studies used to assess the accuracy of the Bosniak classification suffer the usual criticisms of retrospective studies, not least that they include selection bias (Warren, & McFarlane 2005). Only a few studies have correlated cyst classification using the Bosniak system with histological findings after removal of kidneys at surgery. Thus there is a lack of evidence to support the classification’s ability to distinguish between benign and malignant masses. Furthermore the system can also suffer from inter-observer variability between what one Radiologist and another will call a Bosniak II or III lesion (Warren, & McFarlane 2005; Loock et al 2006) (Gabr et al 2009) (McGuire, & Fitzpatrick 2010) (Weibl et al 2012).

What is the risk of malignancy in Bosniak IIF lesions?

There have been differing views on this in the literature. Graumann et al

reported an incidence of malignancy of 12% and stated that this was the same as for Bosniak II lesions (Graumann et al 2013). Loock et al followed ten patients with stage IIF cysts and found two cancers, giving an incidence of 20% (Loock et al 2006).

What imaging modality should be used to follow up Bosniak IIF lesions?

According to Bosniak, IIF cysts are potentially malignant and should be followed with CT examinations, performed to determine whether the cystic lesions change over time with regard to morphology and contrast enhancement pattern, subsequently resulting in an up- or downgrading (Graumann et al 2013)

Several studies report that the chance of malignancy increases to 40-80 % when enhancement is observed within a renal cystic lesion. Graumann et al stated "It is therefore of utmost importance that categorisation of complex cystic changes in the kidney is performed with high-quality CT in several phases" (Graumann 2013)

Whelan et al suggested that a combination of ultra-sound and MRI should be considered as follow-up for Bosniak IIF and reduces the lifetime radiation dose (once the lesion has been characterized by triphasic CT scan) in patients younger than 50 years. (Whelan 2010)

I have not found any reports suggesting the use of Ultrasound alone for

monitoring of Bosniak IIF lesions but it follows from the views of Graumann (*op cit*) that ultrasound would not allow any assessment of changes in enhancement pattern and therefore on its own ultrasound would be insufficient for the purposes of surveillance of Bosniak IIF cysts.

For how long therefore should the claimant have undergone surveillance?

There are currently no national or international guidelines available to succinctly answer this question and as such any recommendations that exist are based on expert opinion (Whelan 2010).

- The European Association of Urology (EAU) Guidelines from 2013 (Ljunberg B et al 2013) state merely (with regard to IIF lesions) that follow up is required because “a small proportion are malignant”
- Whelan et al quote a 5% risk of malignancy and state “there is no consensus or evidence based interval determined for follow up imaging” (Whelan 2010)
- Frye et al stated that for Bosniak IIF lesions one should perform contrast-enhanced renal CT scan studies in 6 months and annually thereafter for at least 5 years (Frye TP)
- In 2009 O’Malley et al published what they believed was at that time the largest series of outcomes of Bosniak IIF and Bosniak III lesions (O’Malley et al 2009)
 - They looked at 81 patients with Bosniak IIF lesions and 31 patients with Bosniak III lesions
 - Of the Bosniak IIF lesions – after median follow up of 15 months

(range 3-98) 12 cases (14.8%) progressed in radiological complexity with a median time to progression of 11 months (3-98 mths). Two cases progressed after 4 yrs of rigorous follow up

- Most progression was observed within the first 18 months of followup with only 2 lesions progressing after 18 months.

However, in these 2 cases progression developed at a delayed interval of greater than 4 years. The fact that most relapses occur within the first 18 months seems to validate the initial recommendations of Bosniak for frequent imaging in this early period

- Progression in complexity but not in size appears to be the most important indication of malignancy. We suggest a followup schedule of 6 months, annually for 2 years and biannually thereafter based on clinical experience. To our knowledge the minimum followup required remains to be defined

In Summary:

- There are no guidelines as to how long patients with Bosniak IIF cystic lesions should undergo radiological surveillance
- Evidence exists for malignancy rates of up to 20% in such lesions (Loock et al 2006)
- In the O'Malley series (probably the largest of its kind as of 2009), after a median follow up of 15 months, 14.8% of Bosniak II lesions progressed radiologically. The median time to progression was 11 months with a range of 3-98 months.

- There are no guidelines to rely on but the published literature suggests annual follow up for 5 years (Frye TP), and O'Malley suggests that the minimum follow up required remains to be defined (O'Malley et al 2009)

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