BT-RADS Implementation

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V 1.02
Updated 2018/02/01
Standardized Brain Tumor MR Reporting

• Problem:
  • Variability in reporting MRIs in brain tumor patients limits usefulness to
    • Referring clinicians
    • Patients

• Proposed solution
  • Standardized report for brain tumor reports
  • Impression categories tied to expected management decisions

• Goals:
  • Simple system which can easily be implemented
  • Maximize consistency across section
  • Minimize ambiguity of report outcomes
  • Easily understandable reports
  • Legend at end to assist the reader
<table>
<thead>
<tr>
<th>Score</th>
<th>Title</th>
<th>Subscore</th>
<th>Description</th>
<th>Associated management recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not scored</td>
<td></td>
<td>New baseline, incomplete study, or otherwise unable to categorize</td>
<td>Continued follow-up, no change</td>
</tr>
<tr>
<td>1</td>
<td>Imaging improvement</td>
<td>1a - Improvement</td>
<td>Improvement in imaging findings suspected to reflect decreasing tumor burden and/or improving treatment effect</td>
<td>Continued follow-up, no change</td>
</tr>
<tr>
<td></td>
<td>Imaging improvement</td>
<td>1b – Medication effect</td>
<td>Improvement in imaging findings potentially due to effect from medications such as increasing steroids or initiating avastin</td>
<td>Continued follow-up, no change</td>
</tr>
<tr>
<td>2</td>
<td>No change</td>
<td></td>
<td>No appreciable change from the prior</td>
<td>Continued follow-up, no change</td>
</tr>
<tr>
<td>3</td>
<td>Imaging worsening</td>
<td>3a – Favor treatment effect</td>
<td>Worsening imaging findings favored to represent treatment effects, including radiation therapy and medications</td>
<td>Decreased time interval of follow-up</td>
</tr>
<tr>
<td></td>
<td>Imaging worsening</td>
<td>3b – Indeterminate</td>
<td>Worsening imaging findings favored to represent an indeterminate mix of treatment effect and tumor worsening</td>
<td>Decreased time interval of follow-up</td>
</tr>
<tr>
<td></td>
<td>Imaging worsening</td>
<td>3c – Favor tumor progression</td>
<td>Worsening imaging findings favored to represent increasing burden of tumor</td>
<td>Consider change in management vs. Decreased time interval of follow-up</td>
</tr>
<tr>
<td>4</td>
<td>Imaging worsening</td>
<td></td>
<td>Worsening of imaging findings highly suspicious for tumor progression</td>
<td>Consider change in management</td>
</tr>
</tbody>
</table>
Detailed categorization criteria
0: Not Scored

- Baseline study (initial diagnostic MRI or most recent post-op MRI)
- Non-tumor findings obscure diagnosis (e.g. infection)
- Non-diagnostic study or otherwise unable to classify

*Designated if any of the above 3 criteria are met*
1a: Improvement

• Decreased enhancing component
• Unchanged or decreased FLAIR component
• No new enhancing or FLAIR lesions
• Unchanged or decreased mass effect
• Clinically stable or improved

-OR-

• All of the above
• On Avastin with response confirmed by 4-week follow up

*All criteria for one scenario should be met
1b: Medication Effect

- Decreased enhancing component
- Unchanged or decreased FLAIR component
- No new enhancing or FLAIR lesions
- Unchanged or decreased mass effect
- Clinically stable or improved
- On increasing doses of steroids or first post-Avastin imaging with decreased enhancement only

*All criteria should be met*
2: No Change

- Unchanged enhancing component
- Unchanged FLAIR component
- No new enhancing or FLAIR lesions
- Unchanged mass effect
- Clinically stable

*All criteria should be met*
3a: Favor Treatment Effect

- Imaging worsening within 12 weeks of completing most recent CRT
- One or both of the following:
  - Increased enhancing component
  - Increased FLAIR component
- No new enhancing or FLAIR lesions outside of XRT treatment zone
- Increased mass effect
- Clinically stable

*All criteria should be met*
3b: Indeterminate

• Imaging worsening outside 12 weeks of completing CRT
• One of the following:
  • Increased enhancing component
  • Increased FLAIR component and increasing mass effect
• No new enhancing or FLAIR lesions outside of XRT treatment zone
• Clinically stable

*All criteria should be met
3c: Favor Tumor Progression

- Increased enhancing component less than 25%
- Increased FLAIR component less than 25%
- No new enhancing or FLAIR lesions outside XRT treatment zone
- Increased mass effect
- Clinically worse

-OR-

- New indeterminate lesion outside of XRT treatment zone (e.g. FLAIR lesion without enhancement)

*All criteria for one scenario should be met*
4: Progression

• Progressive increase in enhancing or FLAIR component over multiple studies over time
• Progressive increase in mass effect over multiple studies over time
• Progressive clinical deterioration

-OR-

• Increased enhancing component greater than 25%
• Increased FLAIR component greater than 25%
• Increased mass effect
• Clinically worse

-OR-

• New definitive lesion outside of XRT treatment zone (e.g. Enhancing lesion)

*All criteria for one scenario should be met
MRI OF THE BRAIN WITHOUT AND WITH IV CONTRAST

Structured report code: 17 MR2

CLINICAL INDICATION: []

TECHNIQUE:
[1.5 or 3.0-Tesla system. Pre-contrast sagittal and axial T1-w, and axial T2-FLAIR, GRE, and diffusion-w sequences of the brain with 40C max. Perfusion: Yes/Perfusion No/(Post contrast axial fat-saturated T1-w and T1-w, and sagittal volumetric T1-w) w images of the brain with axial and coronal reformations. Intravenous contrast material was administered for the examination.]

COMPARISON: [No, No] (No, No)]

FINDINGS:

TUMOR:
Location: []

FLAIR:
[]

Enhancement: [No appreciable contrast enhancement, No]

Perfusion: [Perfusion imaging was not performed, No]

Diffusion: [No diffusion abnormality to suggest hypervascular tumor, No]

OTHER:
No acute infection.
No significant hemorrhage.
No hydrocephalus.
No herniation.
No unexpected fluid collection.

IMPRESSION:
Intraparenchymal mass in the [], with imaging findings most consistent with [neoplasm type/bad grade glioma/low grade glioma/metastasis].
Follow-Up Reporting Template

MRI OF THE BRAIN WITHOUT AND WITH IV CONTRAST

Structured report code: 17 MR2

CLINICAL INDICATION: brain tumor

Tumor Type & Mutations: (tumor type)
Surgical History: (last surgery date)
Radiation History: (radiation completion date)
Relevant Medications: (medications (ketorolac or steroids))

TECHNIQUE: [1.5 or 3.0] Tesla system. Pre-contrast sagittal and axial T1-w, and axial T2-FLAIR, GRE, and diffusion-w sequences of the brain with ADC maps. [Perfusion: Perfusion POD/Perfusion NQ] Post-contrast axial fat-saturated T2-w and T1-w, and sagittal volumetric T1-w images of the brain with axial and coronal reformations. Intravenous contrast material was administered for the examination.

COMPARISON: [None.]

FINDINGS:

TUMOR:
LOCATION: []

FLAIR:
[No change in extent of contrast-enhancing FLAIR abnormality.]
[No new sites of FLAIR abnormality.]

Enhancement:
[No change in extent of enhancing component at primary site.]
[No new sites of enhancement.]

Perfusion:
[No evidence of abnormal hyperperfusion (ADC).]

Diffusion:
[No diffusion abnormality to suggest hypercellular tumor.]

Posttreatment changes:
[Expected post treatment changes are noted. No evidence of new or worsening fluid collection or hemorrhage.]

OTHER:
No acute infection.
No significant hemorrhage.
No hydrocephalus.
No herniation.

No unexpected fluid collection.

IMPRESSION:
1. [Glioblastoma/astrocytoma/oligodendroglioma] status post treatment. [No appreciable change in tumor compared to the prior study (Category: GI-II).]
2. [Otherwise expected post-treatment findings.]

LEGEND:
0 - New baseline, incomplete study, or otherwise unable to categorize
1a - Improvement in imaging findings suspected to reflect decreasing tumor burden and/or treatment effect
1b - Improvement in imaging findings potentially due to effect from medications such as steroids or initiating agent
2 - No appreciable change from the prior
3a - Worsening imaging findings favored to represent treatment effects, including radiation therapy and medications
3b - Worsening imaging findings favored to represent an indeterminate mix of treatment effect and tumor worsening
3c - Worsening imaging findings favored to represent increasing burden of tumor
4 - Worsening of imaging findings highly suspicious for tumor progression.